FIELD CROP ABSTRACTS

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REVIEW ARTICLE

RECENT DEVELOPMENTS IN GROUNDNUT PRODUCTION, WITH SPECIAL REFERENCE TO AFRICA. PT 1

BY

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INTRODUCTION

World production of groundnuts has increased from 9·9 million tons (1948–52 average) to 10·9 million tons (1953–5 average), primarily because of an increase in the area under production outside America (FAO, 1956) ; and the crop is now grown in many new regions. Yields have also tended to rise and this may be a reflection of the gradual intensification of research, with consequent accumulation of knowledge concerning a crop which has often puzzled research workers in the past. The purpose of this review is to examine the trends of recent investigations (particularly in Africa), to summarize their conclusions, and, where possible, to suggest further lines of development.

CLASSIFICATION

Hoehne (1940) defined 12 species of the genus *Arachis*, of which only the groundnut, *A. hypogaea*, is of economic importance. Attempts to classify this species on morphological characters alone proved inadequate and in 1951, Bouffil (1951a) proposed two sub-species—'*africana*' (erect habit), and '*asiatica*' (prostrate habit)—each containing late dormant and early-maturing non-dormant strains. However, all prostrate varieties appear to show some dormancy, and Gregory *et al* (1951) therefore defined groups according to the reproductive capacity of the lateral buds on the central axis. Following this system Bunting (1955) named these 'alternately branched' (Virginia group), and 'sequentially branched' (Valencia and Spanish upright forms). Cytological studies show genetic differences between these groups, which correspond to the commonly recognized commercial types and appear to differentiate truly dormant (Virginia) from non-dormant short-season varieties. Relatively few recognizable varieties are found in the USA, and further sub-division proved necessary when a study of the large collections formed in the Sudan and Tanganyika revealed many strains of African origin not grown in the USA ; Bunting has postulated 22 recognizable sub-groups of varieties based on morphological characters, such as pod-size and -shape, number of seeds and testa colour. Studies in Senegal on flower characteristics suggest that these may also assist in classification, there being a close relationship between the shape of the wing and the calyx, which may differentiate late prostrate from early-maturing erect types (Tardieu, 1954). There are many synonyms and if the systematic classification described by Bunting proves applicable to other large collections, such as those in Bambey (Senegal), of 536 varieties and Gandajika (Belgian Congo), of 200 varieties, it might permit an international nomenclature to be developed. At present each territory tends to adopt its own system and criteria, suited to its market needs—oil in Central Africa, confectionery in N. Africa, domestic consumption and oil in different regions of the USA. An accepted system of classification would save much duplication in plant introduction and testing and would allow an effective interchange of breeding material between different territories. This might prove a rewarding task for an international agency, such as FAO.

DEVELOPMENT AND TESTING OF NEW VARIETIES

The development of new varieties of groundnuts has taken place mainly by selection from within indigenous populations, by introduction, and to a lesser extent by hybridization. Being almost entirely self-pollinated, chance outcrossing is uncommon, although little information seems to be available concerning the extent of natural variation. The time required to produce and distribute a successful artificial hybrid is estimated at 14 years (Gouv. gén. A.O.F., 1956), and, where a large unselected indigenous population exists, or where technical staff is limited, good progress is possible by introduction and/or selection alone. Yield increases of 15% have been obtained by such methods in Egypt (Egypt. Minist. Agric., 1955) and of 33% in the Belgian Congo (De Preter, 1953). Eventually, a point may be reached where further progress is difficult without hybridization, which has achieved considerable success in the USA and produced such varieties as Florispan Runner, Holland Runner, and N.C.2. Bunch. Nevertheless hybridization between varietal groups presents difficulties, due to the short period available for floral emasculation and the low multiplication rate ; whilst inter-specific crosses have shown little promise. However, Gregory (1955) quadrupled genetic variation and produced high-

yielding mutants through X-ray treatment ; the use of mustard gas (Conf. Arachide-Mil, 1955a) and colchicine (Veyret, 1955) has been suggested for the same purpose. Vegetative propagation from cuttings (Demol, 1954) permits more rapid reproduction and, as techniques develop, more progress from hybridization is certain.

Testing of varieties is unusually difficult, since there exist both between and within groups, considerable differences in response to fertilizers and spacing, to diseases, pests and predators (including wild pigs, monkeys, dogs and locusts) and in resistance to sprouting. Shear and Miller (1955) consider that developmental studies are necessary to determine factors affecting fruiting before results can be adequately interpreted, since wide varietal differences exist in the period from first flowering to maturity. Sauger (1954a) stated that strains which produce the largest number of early flowers are the most productive and this may help interpretation, but it is difficult to see how those with such widely differing growth habits and maturation periods as Valencia and Virginia Runner can be compared fairly in the same trial, unless differential spacings and dates of lifting are adopted. New varieties should therefore be studied carefully in observation plots before being tried further or eliminated. Initial trials should compare varieties within broadly similar groups so that the best of each type can be selected, and only these few should enter final regional trials to find the material best suited for multiplication.

Other things being equal, Sauger and Bouffil (1955) consider that varieties selected for multiplication in areas where farmers lack experience in maintaining pure stocks should be those with small seeds and a high reproduction rate per plant. They have shown that natural selection is beneficial to the strains producing the largest number of viable seeds per kilo harvested, and that these types maintain their purity most easily in competition with others. This offers a useful guide to the choice of varieties for distribution in underdeveloped regions. Few studies have been made to determine optimum plot size, however Beattie *et al* (1936) recommend a single 100-ft. row, or five 20-ft. rows ; whilst Robinson *et al* (1948), investigating the problem by means of uniformity trials with replications of six assumed varieties, found the coefficient of variability to be lowest for plots three rows wide and either 50, 37·5, or 25 ft. long. Trial layouts also vary widely, Student's method of couples being used in Senegal (Conf. Arachide-Mil, 1955b), randomized blocks in the Congo and lattice squares in Tanganyika (Bunting and Lea, 1955). No comparative data are available for groundnuts, but these methods have limitations for testing large numbers of varieties and should be used only after initial screening is completed.

Criteria for reporting trials also require standardization. In addition to developmental data, factors determining yield and quality should be considered. Total yield depends largely on the number and weight of sound pods per plant, plant population, and ratio of sound kernels to pods (shelling percentage). Oil content has been shown to vary not more than 5% between varieties and the variation is usually around 2%, which is below the error of 4% involved in its estimation (Conf. Arachide-Mil, 1955c). Differences in oil yield per acre of varieties are therefore determined largely by their total yield. Quality is affected by spacing, time of sowing and fertilizer treatment, but variety is probably the main determining factor, especial importance being attached by the confectionery trade to the shape, colour and weight of pods, and to the distribution of one-, two-, three- and four-seeded pods in the sample. A high percentage of one-seeded, light (pops), diseased or damaged pods profoundly affects the price obtainable for the product and also the total weight available for export, where grading standards are operative. It thus becomes necessary to present results not only in terms of total yield but also of yield of exportable produce, and varieties which give the highest total yield are not always the most attractive to the consumer (Oram, 1957b). In experimental reports, these factors have hitherto received inadequate attention.

PLACE IN THE FARMING SYSTEM

Legumes may exert a beneficial or depressive influence on other crops in the rotation according to whether they are harvested green for fodder or allowed to mature (Oram, 1956). This is very marked with groundnuts and is not due solely to competition for moisture, since Hurwitz (1955) has demonstrated the depressive effects of groundnuts on succeeding crops in irrigated rotations, and the yield of irrigated wheat after groundnuts in Libya was reduced 50% compared with wheat after fallow, even with normal fertilization. Groundnuts must therefore be considered soil-exhausting, probably due to the complete way in which they are harvested. Groundnut monoculture exerts a serious drain on soil fertility, and rotation trials in the USA suggest that groundnut yields are highest when the crop occupies the same land not more than once in 3 years. In Alabama, continuous culture over 16 years reduced yields from one ton to 400 lb. per acre and it was shown there that one great advantage of crop rotation is to maintain the soil-lime and -potash status without excessive fertilization, because of the severe depletion of these two elements by groundnuts (Scarsbrook and Cope, 1956). In Nigeria (1955), the yield of groundnuts after 24 years' continuous culture without added organic matter was only 461 lb. threshed seed per acre ; on plots receiving 3 tons FYM p.a. yield was 915 lb. per acre. The maintenance of organic-mat-

ter status is therefore another primary objective of rotation. The inclusion of a green-manure crop has increased yields very considerably in Alabama and N. Carolina because the improved physical condition of the soil allowed better penetration of the pegs. Green-manure crops (e.g. *Lespedeza*) susceptible to the same diseases as groundnuts must be avoided, as must ploughing-in of groundnut hay to raise organic-matter status, since Miller (1946) has shown that *Cercospora* can overwinter on plant residues or manure in the soil. However, cereals or grasses, including wild species, such as elephant grass (*Pennisetum purpureum*), may be used for green manure provided that they can be incorporated with the soil, and this can increase humus content by 30% (Tourte *et al*, 1954b(2)). Compared with continuous groundnut culture, yields of groundnuts after green manure were increased 104% ; after bare fallow 67% ; and after millet 57%. Green manure, which can usually be grazed or cut for fodder before the residue is ploughed-in, also helps to control erosion whereas bare fallow may often accelerate loss of topsoil.

Other crops normally grown in rotation with groundnuts are summer cereals, cotton, or tobacco. According to climate, and particularly to moisture regime, the system may also include winter cereals, potatoes, and leguminous green-manure- or cover-crops (USA, Libya, Egypt) ; or summer green-manure crops (Central Africa). It has been found in S. Africa, however, that where bacterial wilt (*Bacterium solanacearum*) is prevalent, groundnuts should not be grown in rotation with Solanaceae (Sellschop, 1955). Where groundnuts are exceptionally profitable, they may become the focal point of the rotation, and, in Israel and Libya, many farmers have reduced winter crops in the double-cropping system so that they can prepare the land better for groundnuts and sow early.

In areas of low rainfall, fallowing may prove essential to non-irrigated groundnut culture and it has been shown to increase yields by 300 lb. per acre in Tanganyika (Bunting, 1951) through moisture conservation, weed control, and the elimination of volunteer plants which perpetuate rosette. These plants are also a serious factor in the incidence of fungus disease in the Mediterranean crop, and where there is no fallow the preceding crop should be a cleaning crop to eliminate volunteers and grassy weeds. Because of the relatively poor response of groundnuts to direct fertilization it is usually recommended that other crops in the rotation should be well-fertilized and groundnut fertilization reduced accordingly. York (1952) and other American authorities recommend that cotton, which is particularly sensitive to K-deficiency, should be well-fertilized and precede groundnuts, and that maize, which requires mainly N, should follow in the rotation. Hallock and Miller (1955) have shown that this rotation is significantly more profitable than a 2-yr. groundnut/maize rotation or continuous groundnuts. The economic value of leguminous cover crops is disputable, but where in rotation with a green manure, and a cleaning crop, the rotation plots yielded thrice as much as continuous groundnut plots in the last 3 years of a 10-yr. trial (USDA, 1943).

Few rotation trials have been conducted in Africa, but in the Congo, cotton/groundnuts has given a higher return than either crop alone (De Preter, 1953) ; and this system is also advised in Egypt (Egypt. Minist. Agric., 1955) and in India where it has proved the most profitable of 8 rotations tested (Inst. Pl. Industr., Indore, 1955). The rotation groundnuts/sorghum has been successful in India but Seshadri (1954) suggests that the cereal benefits more than the groundnut, whereas in Nigeria Greenwood (1951) has shown that the latter can effectively utilize the residue of a light superphosphate application to the sorghum. The combination is therefore a happy one. In Senegal, millet takes the place of sorghum, but a 3-yr. rotation including green manure has proved conclusively superior to 2-yr. systems or to monoculture (Tourte *et al*, 1954b(2)).

Subjects worthy of attention in future trials are the introduction of 3-yr. rotations to replace prevailing 2-yr. systems in Africa and India ; the inclusion of a soil-improving leguminous cover- or green-manure-crop which will also provide some fodder ; the value of fertilizer applied to other crops in maintaining groundnut yields and the value of fallow compared with legumes and cleaning crops for maintaining fertility and controlling weeds. The criteria should be total production and economic return from the whole rotation, and not merely groundnut yield compared with groundnut monoculture.

MANURING : GENERAL CONSIDERATIONS AFFECTING THE INVESTIGATION OF NUTRIENT REQUIREMENTS

The groundnut is frequently grown in sandy soils of poor fertility and low humus content. Even so, response to chemical fertilizer is often low, suggesting that the crop can not only use fertilizer applied to other crops in the rotation, but can also maintain adequate growth when soil tests indicate an actual deficiency in certain elements.

DIAGNOSIS

Diagnosis of nutrient deficiencies has been attempted by testing soils and reliable diagnosis of K-deficiency by this method has been reported by Scarsbrook and Cope (1956). A positive correlation between leaf content of potash and yield has been claimed in Senegal, and in Madagascar by Roche *et al* (1956) with leaf potassium/yield of nuts, $r = +\cdot54$ to $+\cdot75$ and 0·49% as the threshold level of deficiency for K in leaves. Most consistent results have been obtained from testing lower leaf

blades at the beginning of fruiting ; but foliar diagnosis can be affected by soil heterogeneity, age of plant, and the part of the plant sampled, whilst its reliability is still uncertain for elements other than potash.

In view of the erratic response of the groundnut plant to fertilizer, and the conflicting results of field trials, it has been suggested that multiple nutrient deficiency is common. Placement is important and the supply of adequate plant food to both rooting and fruiting zones is vital for good yields. Differential response between varieties may also affect results. It seems desirable, therefore, that a systematic examination of fertilizer requirements should include diagnostic tests, the correction of any gross deficiencies by adequate fertilization, trials to determine the optimum method and time of application, and an investigation of varietal responses where more than one variety is commonly grown. Details of the methods used should be stated in reporting trials and thus a clearer picture of the nutrient requirements of the crop may be established.

NITROGEN AND NITROGEN-FIXATION

Because the groundnut is a legume it has been suggested that N is unnecessary for its nutrition and for only 1 of 11 groundnut-growing States in the USA (USDA, 1943) do recommendations exceed 20 lb. N per acre. In Africa, however, considerable responses are reported, both to moderate applications at sowing (Pretorius and Thomas, 1953), and to top-dressing in Israel and Libya, where N is the only fertilizer giving consistent responses (Oram, 1957a). Discussing a similar situation in the Sudan, Bunting (1956) suggests that this may be due to the relatively late stage at which N becomes available by fixation from the numerous large and apparently effective nodules. A detailed study by Jaubert (1951–52a) confirms that nodulation only becomes effective three weeks after sowing but shows that N-fertilizer applied at the time of maximum nodulation (early-flowering period) is still capable of raising yields by 10%. In culture tests, Allos and Bartholomew (1955) showed that well-nodulated groundnuts benefited from a moderate supply of N by increased growth without decreased fixation, but that large applications resulted in reduced fixation. Studies on the amount and timing of N-application to achieve the optimum combination with symbiotic fixation should therefore prove rewarding.

Although failure to nodulate is rarely reported, and inoculation is normally recommended in virgin soil only, nodulation may be reduced where soils are acid or deficient in N, S, Mo, or Mn ; or it may be inhibited by chemical treatment of seed. Conversely it has been stimulated in soils injected with ethylene dibromide against nematodes (Miller, 1951), or by the use of fertilizers containing S (Greenwood, 1951).

It has been suggested that differences exist between the strains of bacteria adapted to American and African varieties, and to erect and spreading types (Jaubert, 1952). This may account for very inadequate nodulation, even with inoculation, reported (in private communications) on irrigated soils in Mediterranean countries, a problem found there with other legumes, e.g. lucerne. This apparently does not prevent high yields, but suggests a need for further work on the whole field of symbiotic fixation and of the value of legumes as soil improvers in semi-tropical regions.

PHOSPHATE

Large responses to phosphate are rarely reported, except when land is newly brought into cultivation, or an exhaustive cropping system followed ; routine recommendations for P-fertilization appear to be chiefly an insurance policy. In Alabama, Scarsbrook and Cope (1956) have shown that the groundnut can use soil P at a lower test level than most crops, and the long residual effect after P-fertilization has been confirmed in West Africa (Nye, 1954). This may account for limited responses to direct application. Furthermore, comparisons by Albrecht (1944) and Greenwood (1954) between 16% superphosphate and more concentrated formulations suggest that the benefit may result as much from the Ca- and/or S-content as from P. However, even where yield increases are truly attributable to P, the 16% formulation usually proves the best, which may account for reported failures to obtain responses where other formulations are used.

POTASH

The crop exercises a heavy drain on soil K and this can seriously depress yields of succeeding crops in the rotation. Nevertheless, economic responses from groundnuts to direct application of K are uncommon. According to York and Colwell (1951), yields are adequate, even where soils are so deficient in K that many other crops fail ; York (1952) accordingly recommends that K should be applied entirely to cotton in a cotton/groundnut rotation, rather than to each crop equally. It is therefore surprising that each of the eleven States-recommendations previously referred to (USDA, 1943), advocates direct application of K usually at rates considerably in excess of those for N. The situation in Africa is generally the reverse, N being recommended, K rarely. Personal communications from six African territories do not mention K ; responses do not appear to have been obtained in the Sudan (Bunting, 1956), Nigeria or the Gold Coast (Conf. Arachide-Mil, 1955d). In Senegal, the critical level of response has been established as the point where potassium content of the leaf falls below 1·0% (Conf. Arachide-Mil, 1955e). In India no response was obtained in trials where a high-fertility status had been maintained, but trials

conducted on ordinary holdings revealed a K-requirement. The conclusion was that K had not previously received adequate trial in India (Mukerjee and Sinha, 1953). Although soils in Africa differ very widely it is doubtful whether K has yet been adequately tested in that continent either.

CALCIUM AND SULPHUR

Groundnuts have been shown in the USA to be very dependent on Ca as a plant nutrient, an adequate supply in both rooting- and fruiting-zones being essential to proper pod-development. Adams (1956) states that Ca applied to exhausted groundnut soil, raised yields by 1000 lb. per acre above that achieved by P- and K-fertilizers, and that quality as reflected in % sound, mature kernels was greatly improved. However, he stressed the need for Ca to be balanced by an adequate supply of major and minor elements. The relation between Ca and K is particularly important ; Colwell and Reed (1946) have shown that K may actually depress yields in the absence of Ca. Conversely, in Madagascar, Roche *et al* (1956) state that although lime increased availability of K in the first year after application, the plants exhausted the supply and yields fell significantly in the second year on plots receiving no additional K. York and Colwell (1951) consider that this occurs only where gypsum is used ; nevertheless a high K/Ca ratio generally produces many ' pops ' and a low shelling percentage. Lime requirement, the response to liming, and the form of Ca which proves most effective have been shown in America to vary greatly with pH, the level of exchangeable Ca, and the nature of the soil colloid (Reed and Cummings, 1948). Careful attention should be paid to these soil properties in diagnosis and recommendations for liming groundnut soils, particularly in making the choice between $CaCO_3$ or a soluble material such as $CaSO_4$ for the supply of Ca.

Following the remarkable results obtained in the USA, trials have been conducted with Ca in African territories, but results have generally proved disappointing, and beneficial effects of gypsum in Nigeria have been shown to be due not to Ca but to S (Greenwood, 1954). This may also account for some responses attributed to N, P, or K in fertilizers containing S. S can increase size of plant, encourage nodulation, improve colour, prevent premature leaf-fall, and develop more pods, more strongly attached to the plant. The residual effect in the fourth year after application may still be considerable. Fundamental research is required to define its exact function and its relation to Ca and the uptake of other elements, but it is clear that S may be of considerable importance in groundnut nutrition.

MINOR ELEMENTS

In American literature isolated reports of deficiencies in Mn, Cu, and Mg appear but these usually seem to be associated with overliming, and, where farmers avoid such malpractices, the application of minor elements is considered unnecessary. The few studies reported from Africa tend to the same conclusion. Bouyer and Collot (1951) found that Cu, Mg, Zn, Mn and Fe had no effect, but that Mo applied alone might prove toxic. B-deficiency has been recorded in pot experiments (Conf. Arachide-Mil, 1955e ; Lévèque, 1955) and Maistre (1956) states that it influences the absorption of all the macro-elements. Gillier (1955) has photographed plants grown in pot-experiments showing total-deficiency symptoms of N, P, K, Ca, and Mg but states that of these N deficiency only has produced really characteristic signs in the field. He concludes that the seed contains sufficient reserves of these elements to support life for 62 days in the total absence of an external source of any one element, although growth practically ceased after the 50th day. This may account for the relatively infrequent occurrence of deficiency symptoms in normal crops, since total absence of a nutrient from the soil is rare, and reserves in the seed may be adequate to prevent the appearance of gross malnutrition in early varieties capable of maturing in 90–100 days. This cannot be confirmed, however, since Gillier was presumably working with late material which had barely begun flowering when the experiment was discontinued; and Reid (1956) has shown that very severe B-deficiency prevents flower formation and less severe deficiency inhibits pegging, whilst limiting N, K, Ca, or Mg after flowering has begun greatly decreases fruit development. Deficiency of these elements can produce rapid symptoms at any stage, other elements rarely show late symptoms if they are in adequate supply up to the time of flowering. Smith (1954) has shown that the reproductive processes of groundnuts are relatively inefficient (only 13·9% of flowers producing mature pods where Ca was adequate, and less where this element was deficient) ; and confirms that reproductive capacity may be modified profoundly by the supply of other nutrients. B-deficiency completely inhibited ' pegging ' whilst ample K and proper proportions of other elements increased the number of flowers forming pegs from a normal 40% to around 95%. Closer study of the function of nutrients in flower- and fruit-development is therefore indicated.

FERTILIZER PLACEMENT

Yarbrough (1949), reporting his studies on groundnut-root morphology, states " Fertilizer placement tests are strongly suggested by this study, but have not, to this writer's knowledge, been conducted." Hall *et al* (1953), working with radioactive ^{32}P found that 60% of the phosphorus absorbed at the end of 14 weeks came from a soil depth of 8 in., and that although the tap root penetrated to 24 in. after only 4 weeks, little

nutrient uptake came from this depth. At that time, 95% of the ^{32}P absorbed came from directly under the plant ; even at 11 weeks, 78% was absorbed from within a radius of 6 in. from the tap root. However, absorption is also possible through gynophores and pods, and this discovery by Burkhart and Collins (1942) has led to the practice of applying gypsum at flowering time to ensure maximum yield of well-filled pods.

Placement studies seem generally to aim at avoiding the undesirable effects of fertilizer concentration, such as damage to germinating seed, or prevention of normal fruiting due to K/Ca imbalance in the area of the developing pods (Collins, 1943). However, farm surveys by Blackstone (1952) did not show significant differences between yields where groundnuts were sown directly over fertilizer or where a side-dressing was used ; and Bouffil *et al* (1951b), comparing broadcasting before sowing, side-dressing and top-dressing after 4 weeks, with placement in pockets 2·5 in. from the seed showed the latter only to be significantly inferior. They attributed this to the slowness with which Ca and P diffused to the root system. In Tanganyika (1955), placement of granular superphosphate has proved about twice as effective as broadcasting, but as band-placement machines are rarely available to the African farmer putting a pinch of granular fertilizer close to the seed as advocated in Nigeria may offer economy over broadcasting. Greenwood (1951) states that pelleted superphosphate can be placed within 0·5 in. of the seed without causing damage.

Fundamental studies suggest that placement of P and K rather deep below the seed might give the best results, but considerable scope exists for investigation in order to develop the most efficient economic placement of fertilizer, rather than merely to avoid harmful effects.

Fertilizer problems appear more complex for groundnuts than for many other crops, particularly in respect of : N-requirements ; the relation between K, Ca and S ; and placement to obtain optimum use of material applied, where absorption may be through roots, gynophores, and fruit. Foliar analysis and soil tests have given limited assistance only and cannot replace field experiments, which should include Ca and S tests in addition to the NPK complex. Perhaps for these reasons, results quoted for different areas are often conflicting, especially where different varieties are used, and this is reflected in fertilizer usage. Collins (1943) states that many American farmers fertilize inadequately ; in several West African territories surveyed by OEEC (1953) fertilizer use was negligible, whilst in the Mediterranean area, application often appears excessive. This suggests that problems concerned with the economic use of fertilizers on this crop are still very far from solution.

(Part 2 of this article will appear in *Field Crop Abstracts* 11, No. 2.)

FIELD CROPS

CEREALS

WHEAT

1 Mirchandani, T. J. and Misra, D. K. **Associated growth of cereal and legumes.** *Indian J. Agron.* 1957, **1,** No. 4, 237–43, bibl. 14. [Indian Agric. Res. Inst., New Delhi]

The best ratio of cereal and legume seed was half and half by weight. The crops dealt with are wheat grown with peas and with lentils.—D.B.

2 Dézsi, L. A növénysúrúség hatása az öszi búza termésére. [**Effect of spacing in winter-wheat crops.**] *Növénytermelés* 1957, **6,** No. 1, 45–52, bibl. 12, illus., Russian and English summaries. [Inst. Phytophysiol., Loránd Eötvös Univ., Budapest]

Under conditions of the test there is evidence that while the closest spacing produced the greatest yields, the increase was counter-balanced by the additional seed required. The total weight of grain per ear is greater in a sparse stand than in a close sowing, thus grain weight per ear in relation to sowing density is a criterion which has bearing on yields. There is also evidence that yields are highest from crops in which the bleeding sap contains the greatest amount of nutrients.— From summaries.—M.H.

3 Banoch, Z. and others. Československý sortiment pšenic v závlahových podmínkách jižní Moravy 1953. **Czechoslovak wheat varieties in irrigated conditions in Southern Moravia.** *Ann. čsl. Acad. agric. Sci., Pl. Prod. Ser.* 1956, **29,** No. 7, 679–700, bibl. 10, illus., English and Russian summaries. [Pl. Physiol. Fac., Masaryk Univ., Brno]

Sprinkler irrigation of 11 spring- and 29 winter-wheat varieties raised grain yields from 2100 to 3000 and from 1900 to 2600 kg./ha., respectively. Spring varieties reacted more uniformly to irrigation than did winter varieties. It was shown that in unfavourable years, average, or above average, yields could be obtained by applying *c.* 70 mm. of water. It was important to irrigate in early spring after a dry winter or during a dry hot spring. The decisive time for irrigation was during shooting and heading in mid-May. The greatest differences in intensity of transpiration between irrigated and non-irrigated wheat occurred in the early stages of growth. Drought resistance was studied by measuring the losses in weight of cut plants every 15 min. for 2 hr. Irrigated plants gave off more water and therefore had a lower resistance.—From authors' summary.

4 Sasso, G. Possibilità ed aspetti dell'irrigazione del frumento. [**Possibilities and aspects of wheat irrigation.**] *Ann. Sper. agr.* 1957, **11,** No. 2, 517–28, bibl. 17, English summary. [Ist. Agron., Univ. Torino, Italy]

Results are given from a trial of wheat-irrigation carried out near Turin in the spring of 1955 when there was a severe drought. Two irrigation treatments, of 800 cu. m. each, were given, one on 15 Apr. and one on 4 May, during the critical growth-period of wheat. The trial plots had sandy silt soil and gravelly subsoil, and two levels of fertility were present. Irrigation raised grain yields by 28% on the less fertile soil, and by 39% on the more fertile soil, over the corresponding non-irrigated plots.—E.B.O.

5 Glover, J. **Rainfall and crop yield.** *Rep. E. Afr. agric., for. Res. Org. 1956* [n.d.], 16–17. [Received Sept., 1957]

From studies on the relationship between the yield of wheat and seasonal rainfall in the Kenya Highlands, it appears that wheat is particularly sensitive to a slight excess of rain at sowing time and at maturity. If more than a little rain falls then, the yield is depressed.—M.P.

6 Sato, T. and Hirashima, C. **Studies on the cultivation of crops at alpine area. 2. Effects of stamping and pruning of blades before a hard winter on the growth and yield of wheat.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **25,** No. 3, 159–60, bibl. 5, illus., English summary. [Kanto-Tosan Agric. Exp. Sta.]

The experiments were conducted at an altitude of 1300 m. Treading of wheat 2 or 3 times before a hard winter promoted tiller emergence, and increased dry weight, sugar content, number of roots and winterhardiness, and resulted in a 10% yield increase. These results were not obtained when the treading was done before a warm winter. Cutting of leaf blades had the reverse effect of treading.—From English summary.—D.B.

7 Mascarenhas, G. H. N. Experimentação de milhos e trigos nos Açores. Um programa em curso. [**Maize and wheat trials in the Azores. A programme in progress.**] *Bol. Com. reg. Cer. Açores* 1956, **12,** No. 24, 63–90, illus., English and French summaries.

The wheat trials are concerned with sowing date, seed rate, manuring, and adaptation ; and the maize trials with plant density, manuring, and adaptation.—E.B.O.

8 Caravello, R. V. A. and others. Condiciones edáficas en la región triguera argentina y el rendimiento del trigo. [**Edaphic conditions in the wheat region of Argentina and wheat yield.**] *Rev. argent. Agron.* 1957, **24,** No. 1–2, 1–39, bibl. 7, illus. [Dir. Gen. Invest. Agríc., Min. Agric. y Ganad., Argentina]

To determine whether the soil was suitable for wheat cultivation, 3 years' trials were carried out on 28 fields in the wheat region of Argentina using the varieties Buck Sarmiento (winter type), Bahiense F.C.S. (medium type) and Olaeta Don Agustín (spring type), each sown on 20 May and 1 June. The soil types varied from sandy loam to clay loam. Results showed highly significant increases in yield as the organic-matter- and calcium-contents of the soil increased. Deficiencies in organic matter were found in 9% of the plots and deficiencies in calcium content in 10%. The yields obtained were : 1660–3780 kg./ha. with Buck Sarmiento, 1990–3760 kg./ha. with Bahiense F.C.S., and 2060–4060 kg./ha. with Olaeta Don Agustín.—E.B.O.

9 Rojas-Peña, E. de. Trigo en tierra caliente. [**Wheat-growing in warm regions.**] *Agric. trop., Bogotá* 1957, **13**, No. 5, 281–92, illus. [Fed. Nac. Arroceros, Colombia]

An investigation in Colombia to find crops which can be grown profitably in rotation with rice has shown that wheat and barley are the best. It is thought that wheat cultivation in particular, now confined to the cold regions of Colombia, can be extended, not only to the rice-growing areas but also to all warm regions where rainfall is adequate, e.g. the valleys of the rivers Cauca, Magdalena, Sinú and the eastern Llanos. An account is given of trials in progress to find suitable varieties. The varieties Bonza and Menkemen, under trial, yielded 987 kg. and 851 kg. of grain (13% moisture) per ha., respectively.—E.B.O.

10 Varela, M. R. Situación del trigo en Colombia. [**Situation of wheat in Colombia.**] *Agric. trop., Bogotá* 1957, **13**, No. 6, 363–8. [Min. Agric., Colombia]

Information is given on production, regions of cultivation and research.—E.B.O.

11† Burov, D. I. [**The place of spring wheat in crop rotations of the forest/steppe on the left bank of the Volga.**] [Russian] *Doklady Vsesojuz. Akad. S-H Nauk (Proc. Lenin Acad. Agric. Sci.)* 1957, **22**, No. 4, 3–7, illus. [Kuĭbyšev Agric. Inst.]

In the area concerned, crops which precede spring wheat in rotations include either a herbage ley or hoed crops. From a study of rotations made at the above Institute during 1947–56 it is concluded that the best predecessor for spring wheat in the southern part of this region is winter rye. A herbage ley affects the wheat adversely, partly because of the drying effect of the herbage on the soil layer occupied by roots, and also because the lumpy and coarse crumb-structure of the arable layer allows evaporation of moisture from the soil surface.—M.H.

12 Henkelj, P. A. and others. [**The principal features in the physiology of wheat grown under the new system of soil cultivation.**] [Russian] *Izv. Akad. Nauk., SSSR (Bull. Acad. Sci. USSR)* 1957, Ser. Biol. No. 4, 448–65, bibl. 34, illus. [Timirjazev Inst. Pl. Physiol., Acad. Sci. USSR]

The work reported covers the period 1953–6 and was carried out in the Kurgan Province [approx. 55°N. lat., 65°E. long.]. The new system is that of Maljcev who advocates a deep ploughing (without mouldboard) and subsequent shallow ploughings for several years. The information includes a comparison of the physiological reactions of the wheat variety Lutescens 758 at different growth phases, after normal cultivation of the soil or after deep ploughing. It is claimed that the latter has beneficial effects on the wheat crop as a result of the increase in weight, volume and absorptive area of the roots when compared with roots of wheat grown after normal cultivations.—M.H.

13† Hanley, F. and others. **The effect of leys on soil fertility. 1. The effect of management of clover aftermath on the yield of the succeeding wheat crop.** *J. agric. Sci.* 1957, **49**, Pt 2, 251–7, bibl. 5. [School Agric., Univ. Cambridge]

Broad red clover [*Trifolium pratense*], sown at 14 lb./ac. in a cereal nurse crop the previous spring, was cut and made into hay during June. The aftermath received the following treatments : (a) ploughed after removal of the hay crop, then bastard fallowed ; (b) cut at full-flower stage and removed as hay, (c) grazed by sheep at full-flower stage ; (d) ploughed at full-flower stage (green-manure) : (e) grown to ripe-seed stage then cut and removed. Wheat was drilled in the autumn and developmental data and yield were recorded. There was little consistent difference in the effects of treatments (b), (c) or (d) ; while treatments (a) and (e) showed large seasonal fluctuations in their effects. In no season did taking the 2nd crop for hay give lower yields than any other treatment. —M.P.

14 Boletín de Producción y Fomento Agrícola. Resultados de los ensayos comparativos de rendimiento " standard " entre variedades de trigo. [**Results from comparative "standard" yield trials with wheat varieties.**] *Bol. Prod. Fom. Agric., Argent.* 1955, **7**, No. 55–60, 21–69.

This paper gives tabulated results from trials carried out to determine the suitable areas of cultivation and the optimal sowing dates for commercial wheat varieties in Argentina. For the object of these trials the wheat area was divided into 5 subregions. The data given (averages for 1950–5) include : yield ; hectolitre weight ; susceptibility to *Puccinia* spp., *Ustilago* sp., frost,

lodging, seed shedding and drought; number of days from germination to earing and from germination to ripening ; and plant height.—E.B.O.

15 Edinburgh and East of Scotland College of Agriculture. Field Experiments Committee. **Winter wheat variety trials 1954 to 1956.** *Tech. Bull. 21 Edinb. E. Scot. Coll. Agric.* 1957, pp. 12.

Results of 10 trials with Als (control), Alpha, Cappelle Desprez, Masterpiece, N. 59 and Victor II are tabulated and discussed. On average, Cappelle Desprez and N.59 were superior to the other varieties in yield and straw-strength ; they had shorter straw, greater resistance to yellow rust and were earlier than the other varieties.—M.P.

16 Mikkelsen, K. Sortforsøk med høsthvete (og sammenlikning med høstrug) på Sørøstlandet i perioden 1949/50-1954/55. **Varietal trials with winter wheat (and a comparison with winter rye) in south-eastern Norway during the period 1949-50-1954-5.** *Forskn. Fors. Landbr.* 1957, **8,** No. 2, 113–24, bibl. 27, English summary. [Farm Crop Inst. Vollebekk, Agric. Coll. Norway]

In 35 experiments, 23 winter wheat varieties of Norwegian and Swedish origin and 2 Swedish varieties of winter rye were compared. In all experiments winter rye gave a higher grain yield than winter wheat. Kungsråg II, a diploid rye, was highest with 3660 kg. grain/ha. and was more stiff-strawed than the tetraploid Dubbel Stålråg, which gave 3410 kg./ha. Of the wheat varieties, the new Swedish W11783 gave the highest yield, 3250 kg./ha., and proved to be frost-resistant and stiff-strawed. Virtus and Sigyn II yielded 3060 and 2850 kg./ha., respectively. Both are winter-hardy and have a tendency to lodge. Odin, Ertus and Ergo II gave 2930, 3010 and 2920 kg. grain/ha., respectively. They are very stiff-strawed but not sufficiently frost-resistant for the district.—J.K.L.

17 Hoeser, K. Der Sommerweizen in den bayerischen Landessortenversuchen. [**Spring-wheat in the Bavarian State varietal trials.**] *Bayer. landw. Jb.* 1957, **34,** No. 2, 249–61. [Landessaatzuchtanstalt, Weihenstephan, Bavaria]

At present the cultivation of spring-wheat in Bavaria is unimportant compared with that of winter-wheat and other cereals. Yet, in 13 locations (from Oberpfalz to Upper and Lower Bavaria) the 7-yr-average yield of spring-wheat was only 4·2% or 160 kg./ha. lower than that of winter-wheat. With the object of increasing the area of spring-wheat several varieties were tested. The very stiff-strawed varieties were Heines Koga II and Janetzkis Probat ; stiff to medium stiff, v. Rümkers Erli and Bornebusch Onolida ; medium to weak, NOS-Nordgau and Lichti II. Lichti II was the most disease-resistant ; v. Rümkers Erli gave the highest grain yield ; Lichti II, NOS Nordgau, Koga II and (for one year) Janetzkis Probat also gave good yields.—D.B.

18 Mitteilungen für die Schweizerische Landwirtschaft. Svenno, ein neuer Sommerweizen im Richtsortiment. [**Svenno, a new spring-wheat in the official list.**] *Mitt. schweiz. Landw.* 1957, **5,** No. 5, 95–6.

The new Swedish variety, Svenno, has recently been admitted to the official list of varieties. Taking the average of 19 trials in German Switzerland, its yield was lower than that of Lichti I (the standard). Svenno is more resistant to lodging than Lichti I. It is susceptible to black rust and is 4–5 days later in maturing than Lichti I. For these reasons it cannot be grown in rust areas or in alpine foothills. It is recommended for the lowlands as a substitute for the Lichti series of wheats. [See also next abstract.]—D.B.

19 Zweifel, J. and Pugnat, C. Le froment de printemps Svenno. [**Svenno, a spring wheat.**] *Rev. rom. Agric.* 1957, **13,** No. 7, 50–3, bibl. 18, illus. [Stat. féd. d'essais agric., Lausanne, Switzerland]

When tested in Lausanne, the new Swedish variety, Svenno, proved to be superior to Lichti I in : (a) yield of grain and straw ; (b) speed and regularity of emergence ; (c) resistance to *Erysiphe graminis*, *Puccinia graminis* and *Septoria* ; (d) resistance to lodging and germination of grain in the ear ; (e) milling and baking qualities. Svenno matures later than Lichti I and is inferior in vegetative development, and resistance to *Puccinia triticina* and *P. glumarum*. Owing to its late maturity, it is not recommended for high altitudes in French Switzerland. [See also previous abstr.]—D.B.

20 Pollmer, G. Untersuchungen zur Ertragsbildung bei Sommerweizen. [**An investigation into the factors contributing to yield in spring-wheat.**] *Z. PflZücht.* 1957, **37,** No. 3, 231–62, bibl. 49, illus. [Inst. Acker- u. Pflbau Weihenstephan der Techn. Hochsch. München]

Two new varieties, v. Rümkers Weihenstephaner Erli-Sommerweizen and Heines Koga II, gave higher yields than the older varieties Hohenheimer Franken and Wahrberger Sommerweizen. An analysis of the factors contributing to yield revealed that the greater yield of the new varieties was attributable to their capacity for a greater density of stand and a greater density of ears per ha. Variety and sowing rate also influenced the yield. A heavier sowing rate could arrest the depressing effect of late sowing on yield. Evidence obtained from an analysis of results of 58 Bavarian varietal trials supported the above results.—D.B.

21 CASALE, F. Tre novità granarie. [**Three new wheat varieties.**] *Atti Convegno Novità granarie, Vicenza, 1955*, 1956, 105–14. [Sta. Sper. Granicolt. Catania, Sicily]

The following 3 varieties of *Triticum durum* are described : Duro S.G.3., Capeiti 8 and Patrizio 6. These varieties are already grown in Sicily (arid climate, clay soils) where they show greater resistance to the adverse climate, and are higher yielding, than the old varieties.—E.B.O.

22 QUAGLIOTTI, F. Secondo quadriennio di prove su cultivar di frumento nel piano bolognese. [**Second 4-year-period of trials with wheat cultivars in the Bologna plain.**] *Ann. Sper. agr.* 1957, **11**, No. 3, 821–57, bibl. 7, illus., English summary. [Ist. Agron., Univ. Bologna, Italy]

The cultivars Produttore (S.6) and R.37, which yielded well and showed good characteristics in 4 years' trials, are recommended for cultivation in the Po Plain.—E.B.O.

23 VILLANUEVA, N. R. " Helvia", una nueva variedad de trigo para el Perú. [**Helvia, a new wheat variety for Peru.**] *Bol. 66 La Molina Esta. exp. agric.* 1957, pp. 37, bibl. 7, illus., English summary.

The wheat variety Helvia is awned and of medium height. Its grain is red and of medium size. Helvia is recommended for cultivation at altitudes from sea level to 2500 m.a.s.l. On the Coast of Peru the sowing period is 15 May–30 June. Helvia should be irrigated for a short period only and with little water, and harvested 130–140 days from sowing. It yields up to 12 tons of grain per fanegada (3 ha.).—From author's summary.

24 AGRICULTURA TÉCNICA, MÉXICO. Los mejores trigos para 1956–57. [**The best wheats for 1956-7.**] *Agricultura téc., Méx.* 1956–7, No. 3, 3–5 and 32–3, illus. [Ofic. Estudios Esp., Secr. Agric. y Ganad., Mexico]

Results are given from field trials carried out to compare both new and commercial wheat varieties in the principal wheat regions of Mexico. The characteristics of the recommended varieties, and their sowing dates, are given.—E.B.O.

25 SEN, S. and SOMAYAJULU, P. L. N. **A study on wheats from Afghanistan.** *Indian J. Genet.* 1956, **16**, No. 2, 105–20, bibl. 15. [Indian Agric. Res. Inst., New Delhi]

Data are tabulated on the range of variation in plant characters of material collected in Afghanistan in 1939 and maintained at the Simla Sub-Station of the Indian Agricultural Research Institute. Twenty wheat species and varieties were studied for spike length and density, length of glume-beak and tenacity of glumes, grain-length, -texture and -colour, maturity and rust-resistance. The species *Triticum persicum*, *T. dicoccum* and *T. monococcum* are reported from Afghanistan for the first time. A detailed key for the identification of the 134 individual wheat cultures is included.—M.P.

26 GUTTAY, J. R. **The effect of fertilizer on the germination and emergence of wheat and oats.** *Quart. Bull. Mich. agric. Exp. Sta.* 1957, **40**, No. 1, 193–202, bibl. 3.

In greenhouse trials, wheat and oat seed were sown in flats in direct contact with different amounts of N, P or K fertilizers, used singly, or in combination. The soil-moisture content was held at approximately field capacity. Application rates of less than 100 lb. of fertilizer per ac. had, in most cases, little effect on wheat emergence, while rates above 100 lb. markedly reduced emergence. With oats, the fertilizers had little effect on emergence except for a slight reduction where K was used. The effect of superphosphate, in combination with N, K, or N + K, appeared to be very detrimental to emergence. The seedling emergence of wheat seed sown 1 in. to one side of, and 1 in. above, fertilizer placed in drills, was similar to that of seed sown without fertilizer. Wheat seed sown in contact with fertilizer suffered a greater reduction in emergence in dry than in moist soil. Seed of initially poor quality suffered greater reduction in emergence through fertilizer damage than did seed of good quality.—P.J.B.

27 SODERHOLM, L. H. **Effect of dielectric heating and cathode rays on germination and early growth of wheat.** *Agric. Engng, St. Joseph, Mich.* 1957, **38**, No. 5, 302–7, bibl. 11, illus. [Nebraska Agric. Exp. Sta.]

When wheat grain was heated by an electric field, no appreciable damage to germination was caused at 150°F. for a grain moisture content of 14%, nor at 190°F. for a 9% content. Germination of grain exposed to cathode rays for 45 sec. was not affected by 10,000–200,000 rep., but growth was markedly affected by the higher dosages. The number of seedlings reaching the soil surface (0.5 in.) was reduced and their continued growth was checked completely by 40,000–200,000 rep. The lethal range for seedlings was 30,000–40,000 rep.—From author's summary.

28 GOEBELEZ, A. E. Un procédé peu utilisé pour trier les semences suivant les différences de densité. [**A little-used method for separating seeds based on differences in density.**] *J. Agric. trop. et Bot. appl.* 1957, **4**, No. 3–4, 159–63, illus. [Fac. Agric., Ankara, Turkey]

The weeds of wheat crops in Turkey are listed. The seeds of *Cephalaria syriaca*, in particular, cannot be separated from wheat seeds by the usual methods because of their similar size. As *C. syriaca* seeds, with a high oil content, have a

different density from wheat seeds, they can be separated from them by using a liquid of 1·220–1·245 density (water 10 l., ammonium sulphate 3–3·5 kg., cerecan un.nass 10 g.). All the weed seeds present in Turkey, except legume seeds, float on this liquid, while wheat- and legume-seeds sink to the bottom. This solution also protects wheat from *Tilletia* sp. This new method for separating seeds can be used in other cases, e.g. for separating rice seeds from *Sorghum* seeds ; the former remain at the surface while the latter fall to the bottom.—E.B.O.

29 HOLTON, C. S. **Wheat smut control in the Pacific Northwest.** *Agric. Chem.* 1957, **12,** No. 7, 42–3, 95, illus., bibl. 3.

The results of experiments since 1951 in the Pacific Northwest indicate that 40% hexachlorobenzene applied at 0·5 oz./bu. of seed is the best material for protecting wheat against soil- and seed-borne *Tilletia* spp. It is equalled only by PCNB and dinitrofluorobenzene at higher application rates.—J.F.C.

30 HACKER, R. G. and VAUGHN, J. R. **Chemically induced resistance to stem rust of wheat by derivative of acti-dione.** *Pl. Dis. Reptr* 1957, **41,** No. 5, 442–6, bibl. 4. [Wyoming Agric. Exp. Sta.]

Pre-infection applications of the semicarbazone of cycloheximide at 200 ppm. controlled black stem rust (*Puccinia graminis tritici*) on the spring-wheat variety Onas until maturity, i.e. 38 days from the last application. Phytotoxic effects were negligible. —J.F.C.

31 SLYKHUIS, J. T. and others. **Relation of date of seeding winter wheat in southern Alberta to losses from wheat streak mosaic, root rot, and rust.** *Canad. J. Pl. Sci.* 1957, **37,** No. 2, 113–27, bibl. 9, illus. [Exp. Fm, Lethbridge, Alberta]

Diseased, immature wheat is the most highly infectious reservoir of the streak mosaic virus, *Marmor virgatum* and its mite vector, *Aceria tulipae*, in southern Alberta. Sowing-date experiments showed that losses from wheat streak mosaic were greatest in winter-wheat which had been sown before maturity of nearby winter- or spring-wheat crops that harboured the disease. Wheat that emerged after the diseased crops had matured was seldom infected. Infection was able to spread from diseased volunteer wheat as long as it was living, or until the weather became cold in late October or November. Wheat sown in August was more severely damaged than that sown later. Immature wheat harbouring mosaic infection was completely destroyed by one operation with a mouldboard plough, but not by one cultivation with the one-way disk or subsurface type of cultivator. Root rot was most severe, and stem rust least severe in wheat sown in August. In the absence of disease, yields decreased in sowings made after mid-September. Early September appears to be the best time to sow winter wheat in southern Alberta. —From authors' abstract.

32 VALDEYRON, G. Enseignements techniques à tirer de la campagne de cereales 1954–55 en Tunisie. [**Technical information derived from the 1954-5 cereal season in Tunisia.**] *Tunisie agric.* 1955, Nov.-Dec., pp. 18, illus. [Serv. Bot. Agron., Tunisia] [Received Aug., 1957]

This address to the Agricultural Society of Tunisia is concerned mainly with durum wheat, the malady known as " yellow-berry " which affects it, and wheat varieties. First results from trials showed a relationship between yellow-berry and unbalanced N-nutrition.—E.B.O.

33 WIENHUES, F. and GIESSEN, J.-E. Die Abstammung europäischer Weizensorten. [**The origin of European wheat varieties.**] *Z. PflZücht.* 1957, **37,** No. 3, 217–30, bibl. 18, illus. [Max-Planck-Inst. Züchtungsforschung, Köln-Vogelsang, W. Germany]

34 MALKANI, T. J. and VAIDYA, S. M. **Morphological characters of shoot and root in relation to lodging in three varieties of wheat.** *Indian J. Genet.* 1956, **16,** No. 2, 121–33, bibl. 28. [Indian Agric. Res. Inst., New Delhi]

A field experiment with 3 varieties of wheat, C 518, N.P. 165 and N.P. 12, and N, at 0 or 80 lb./ac., was laid out with 4 replicates in 1951–2. A number of plant characters, including tiller number and height, breaking strength, ash, silica and lignin content, were determined 1 week after anther dehiscence and correlated with percentage lodging to obtain suitable indices of lodging. N application increased the shoot : root ratio, and the length of the lowest internode, but decreased breaking strength, weight of unit length and number of cells in the sclerenchyma, and certain root characters. Breaking strength and shoot : root ratio appeared to be good indices of lodging.—From authors' summary.

35 MANNER, R. **The occurrence of plants with only one seminal root in rye and wheat and its consequence.** *Acta agric. scand.* 1957, **7,** No. 2–3, 260–74, bibl. 35. [Pl. Breed. Inst. Gullåker, Hammenhög, Sweden]

On testing the germinating capacity of grain in 1954 a high incidence of young plants of rye and wheat with one seminal root only was observed. Investigations showed that in winter rye, 44% of the plants with one seminal root survived against 56% of the plants with more than one. For spring wheat the figures were 44 and 51%, respectively. The average number of kernels and the mean grain yield were smaller for both rye and wheat plants with one, than for plants with several, seminal roots. The comparative value, based on mor-

tality and grain yield, of plants with one seminal root only was for rye 55% and for spring wheat 82% that of plants with more than one seminal root.—J.K.L.

36 Frazier, J. C. **Low temperature killing of winter wheat flowers.** *Suppl. Pl. Physiol.* 1957, **32,** xxvii. [Kansas State Coll., Manhattan]

Studies carried out over 10 years have yielded data on the temperatures lethal to flowers of currently grown varieties of hard red winter wheat. The plants were started outdoor in early October and brought into a greenhouse at 65–70°F. in weekly instalments for 10 consecutive weeks, beginning in early January. The tests were carried out in a thermostatic chamber where the temperature was varied at 0·2°F. intervals between 25·2 and 27·6°F. The floral organ (pistil or stamen) most susceptible to cold damage was also determined.—From summary.

37 Petr, J. Některé zvláštnosti biologie českých přesivek (Předběžné sděleni). [**Some biological features of the Czech interchangeable wheat. (Preliminary report).**] *Sborn. Vysoké Školy Zemed. Praze (Acta Univ. Agric., Praha)* 1956, 179–88, bibl. 12, illus., Russian and German summaries.

Among Czechoslovakian wheat varieties there are types which may be sown either in spring or autumn. The author's study has shown that these interchangeable forms do not require a specific temperature in order to pass the vernalization phase, but can continue their phasic development either at low or relatively high temperatures (24°C.). There is also evidence that the photophase in these types is prolonged ; under natural long day, the photophase may last for 40–46 days. There is, further, an indication that short day produces the typical prostrate growth habit in interchangeable types. Development in these forms is retarded by short days, which thus increase the intensity of tillering. The difference between interchangeable wheats and spring wheats is, essentially, in the length of their photophase, and also their sensitivity to short day. When sown in autumn their reaction to short day ensures winter-hardiness of the crops.—From summaries. —M.H.

38 Khalil, M. S. H. **The interrelation between growth and development of wheat as influenced by temperature, light and nitrogen.** *Doct. thesis Univ. Wageningen, Netherlands* 1956, pp. 73, bibl. 132, illus.

39 Riddell, J. A. **Studies on the responses of spring wheat varieties to temperatures and daylength.** (Parts 1–4) *Diss. Abstr.* 1957, **17,** No. 3, 472. (Purdue Univ.)

40 Nanda, K. K. and Chinoy, J. J. **Analysis of factors determining yield in crop plants. 1. Varietal differences in yield of grain and straw of wheat as influenced by photoperiodic treatment. 2. The influence of photoperiodic treatments on characters determining yield in wheat with special reference to the temperature of the ripening period.** *Pl. Physiol.* 1957, **32,** No. 3, 157–69, bibl. 67, illus. [Dep. Bot., Univ. Delhi]

The grain and straw yields of 3 wheat varieties were studied under long- and short-day treatments at seedling and later stages. Both treatments reduced yields and the grain : straw ratio. The effect of short days was to reduce the rate of assimilation, whereas the effect of long days appeared to be due to the action of light on the formation of regulatory substances. The number of ears per plant, ear-length, number of spikelets and grains per ear, and 1000-grain weight were all reduced by the 2 types of day-length treatment. Highly significant positive correlations between grain yield and these yield characters and between the yield characters and height and number of tillers were found. After the analytical elimination of the effect of these characters determining yield, correlation between yield per ear and mean maximum temperature during ripening was non-significant. This result is ascribed to an increase in the sterility of pollen grains under both treatments causing a reduction in the fertility ratio and hence in the grain yield.—From authors' summaries.

41 Kravcova, B. E. [**The intensity of translocation of assimilates to spring wheat grain when the crop is grown under different sowing densities.**] [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR)* 1957, **113,** No. 5, 1163–4, bibl. 8. [Moscow State Univ.]

The soft spring-wheat variety Lutescens 62 was used in the experiments, with sowing densities of 10 grains per linear metre (thin sowing) and 150 grains/linear m. (dense sowing) ; inter-row spaces were maintained at 20 cm. throughout. Translocation of nutrients to the grain was studied each day, after exposing the leaves (of 5 different levels) to CO_2 for 20 min. (using labelled C), from the beginning of grain formation (6 July) to the beginning of milk-ripeness (16 July). The separate leaves (2nd, 4th, 5th, 6th and 7th) were kept in $^{14}CO_2$ for 20 min. by means of Plexiglass [polymethacrylic resin] covers, of 250 cm^3 capacity, the concentration of CO_2 being 1% ; 0·1% of the CO_2 comprised $^{14}CO_2$. There is evidence that at the time of grain formation the lower leaves (2, 4, 5) are of little significance for supplying assimilates to the reproductive organs, while the remaining leaves (6, 7) are of great importance for this function. For example, in thin sowings

leaves 2 to 5 after being exposed to $^{14}CO_2$ produce 4–8 counts/min. in the grain, while the 6th leaf produces 56 counts/min. and the 7th, 429 counts/min. These facts confirm other published data (e.g. Zabluda, *Dokl. Akad. Nauk SSSR*, 1947, Vol. 57, No. 7) on the greater importance of the upper leaves compared with the lower, during grain filling. The author's results also show that this greater significance of the upper leaves is more pronounced in dense sowings compared with sparse ones ; for example, at the stage of milk-ripeness, the 6th leaf in sparse sowings produced 200 ± 44 counts/min. in the grain and in dense sowings 1269 ± 139 counts/min. This greater intensity of translocation of the leaf's assimilates occurs in spite of the weaker intensity of light (2–3 times less) in dense sowings. Apparently a deficiency in the amount of assimilates from leaves in dense sowings limits grain yield per ear. If grain weight per ear in thin sowings is greater than in dense sowings (estimated as 6-fold) this is supported by the fact that after treating the upper leaf with $^{14}CO_2$, the content of radio-active C (calculated in dry weight of the grain per ear) in thin sowings is almost half as much again as in dense sowings. It is concluded that the upper leaves in thin sowings ensure the filling of a greater number of grains than in dense sowings.—M.H.

42 FINNEY, K. F. and others. **Effect of foliar spraying of Pawnee wheat with urea solutions on yield, protein content, and protein quality.** *Agron. J.* 1957, **49**, No. 7, 341–7, bibl. 6, illus. [Kansas Agric. Exp. Sta., Manhatten]

In 1949, the protein content of the grain of Pawnee wheat was increased from 9·3–16·9% by spraying the leaves with a urea solution during fruiting. In 1950, the wheat was sprayed a number of times with urea solutions at 3 concentrations (or total amounts) at different times before and after flowering. Yield increases were obtained with the higher concentrations applied before flowering ; thus, one spraying of 10 and 50 lb. N/ac. 7 weeks before flowering increased the yield from 29 to 35 and 41 bu./ac., respectively. The yield was reduced after spraying 15 times at 50 lb./ac. throughout the fruiting period, but the protein content was raised from 10·8–21%. One spraying at flowering increased the protein content by 4·4%. In 1951, 3 concentrations for the 50 lb./ac. rate were employed, but the maximum increases in protein content after spraying at flowering were less than half those obtained in 1950. Yield increases were not obtained owing, most probably, to the use of a much more fertile soil.—J.F.C.

43 BROWN, C. M. and WEIBEL, R. O. **Border effects in winter wheat and spring oat tests.** *Agron. J.* 1957, **49**, No. 7, 382–4, bibl. 5, illus. [Illinois Agric. Exp. Sta., Urbana]

OATS

44 EDINBURGH AND EAST OF SCOTLAND COLLEGE OF AGRICULTURE. Field Experiments Committee. **Low-ground oat variety trials, 1954 to 1956.** *Tech. Bull. 20 Edinb. E. Scot. Coll. Agric.* 1957, pp. 12.

45 EDINBURGH AND EAST OF SCOTLAND COLLEGE OF AGRICULTURE. Field Experiments Committee. **A report on high-ground oat variety trials. 1954 to 1956.** *Tech. Bull. 23 Edinb. E. Scot. Coll. Agric.* 1957, pp. 12.

Ayr Commando, Ayr Line Potato, Blenda, Lightning, Palu and Sun II (control) were compared. Sun II was the best grain producer.—M.P.

46 SCOTTISH AGRICULTURE. **Oat variety trials 1954-56.** *Scot. Agric.* **37**, No. 1, 43.

Brief notes are given on the grain and straw yields and other characteristics of Ayr Everest, Lightning and Aa. 732. It was concluded that, with the exception of Lightning grown under upland conditions, no variety could compete with Blenda and Sun II on normal arable farms in Scotland.—P.J.B.

47 PERSSON, P.-J. Studier över mellansvensk svarthavre. I. Den mellansvenska svarthavrens odlingsområde. **Studies on Central Swedish black oats. 1. The region of cultivation of Central Swedish black oats.** *Sverig. Utsädesfören. Tidskr.* 1957, **67**, No. 2–3, 178–94, bibl. 18, illus., English summary.

The area under black-hulled oats in eastern Sweden, between Småland in the south and Uppland-Gästrikland in the north, has been steadily decreasing. In 1955 the total acreage with black oats was estimated at about 90,000 ac. In variety trials, Stormogul II gave the highest yield and is the most widely grown black-hulled variety in this region. Sol (Sun) and Blenda II are the 2 most widely used white oat varieties, followed by Rex and Seger I (Victory).—J.K.L.

48 WELSH, J. N. **Garry and Rodney oats.** *Agric. Inst. Rev.* 1957, **12**, No. 4, 13–15 and 48, illus. [Cereal Breed. Lab., Winnipeg, Manitoba, Canada]

" Garry and Rodney are 2 high-yielding oat varieties each possessing greater combined resistance to the rusts and smuts than any other variety." An account is given of their history, distribution and yields. In Eastern Canada, the 3-year-average results from 15 stations show that Garry (78·6 bu./ac.) is superior to Rodney (73·2 bu./ac.). In Ontario, Garry was superior to all other varieties. In the Prairie Provinces (16 stations) Rodney was the better variety. In Manitoba, where rust is prevalent, both varieties gave considerably higher yields than the other

varieties tested (Ajax, Exeter, Victory), being about 15% higher than the provincial average. In Saskatchewan, they were excelled by Exeter, and in Alberta by Victory.—D.B.

49 Suneson, C. A. **Improved oat variety resistant to drought, shattering and stem rust, the new Indio shows promise.** *Calif. Agric.* 1957, **11**, No. 8, 4.

Indio, developed principally in summer-grown rust-testing nurseries during 1940-55, equalled Palestine in yield, even when there was no stem-rust injury, and has a 1 lb. advantage over Palestine in test weight.—J.F.C.

50 Herrmann, P. Wirkung von Wuchsstoff-mitteln auf verschiedene Hafersorten. [**Effect of growth substances on several varieties of oats.**] *Bayer. landw. Jb.* 1957, **34**, No. 1, 94–110, bibl. 11. [Landessaatzuchtanstalt, Weihenstephan München, W. Germany]

The reactions of 6 oat varieties to 2,4-D and MCPA at 1·5 l./ha., applied (a) 40 and (b) 60 days after emergence, were recorded. Late treatment by either herbicide caused little damage ; early treatment caused more damage, 2,4-D being the more injurious. MCPA is the better herbicide for weed control in oats because it can be applied over a longer period of the crop's growth without causing crop injury.—D.B.

51 Coffman, F. A. **Cold-resistant oat varieties also resistant to heat.** *Science* 1957, **125**, No. 3261, 1298–9, bibl. 9. [U.S.D.A., Beltsville, Md]

Oat plants of 12 varieties belonging to *Avena sativa* and *A. byzantina* were exposed to 48·5–51°C. for 45 min. Quick-growing plants (mainly spring varieties), with thick culms, were less heat-resistant than slower-growing plants (mainly winter varieties), with more slender culms. On the average, early-maturing oats, whether spring or winter, appeared to be more heat-resistant than late varieties. Heat- and winter-resistance were positively correlated. The plants were more resistant to heat at 40–45 days old in spring varieties and at 45–50 days in winter varieties, than at earlier or later stages.—J.F.C.

52 Casserly, L. M. **The effect of nitrogen, phosphorus and potassium on lodging in oats.** *Canad. J. Pl. Sci.* 1957, **37**, No. 3, 245–51, bibl. 14, illus. [Illustration Stations Div., Exp. Farms Service, Ottawa, Ontario]

Studies under both greenhouse and field conditions have been conducted to determine the effects of N, P and K on lodging of oats. Resistance to lodging in oats is influenced to an important degree by the development of culm, coronal root system, and plant height. The effects of N, P and K on these 3 characters were measured and combined into a single lodging-index value in order to determine the complete effect of treatment on lodging. P improved lodging resistance to an important degree. N increased lodging susceptibility, except when it was combined with P. K, alone, improved lodging resistance but was not effective when applied with either P or N. The greatest resistance to lodging was provided by a combination of N, P and K.—Author's abstract.

53 Roschach, H. Über eine verbesserte Methodik zur Ermittlung der Stickstoff-bilanz junger Haferpflanzen. [**An improved method for determining the N-balance in young oat plants.**] *Z. PflErnähr.* 1957, **77**, No. 1, 37–52, bibl. 37. [Inst. PflErnähr. u. Bodenbiol., Landw. Hochsch. Hohenheim, Stuttgart-Hohenheim, W. Germany]

[See *Soils and Fertilizers* 20 : 1267.]

54† Jones, L. H. P. **The relative content of manganese in plants.** *Plant and Soil* 1957, **8**, No. 4, 328–36, bibl. 15, illus. [CSIRO, Div. Pl. Ind., Sch. Agric., Univ. Melbourne]

During 1953–5, oats, vetch (*Vicia sativa*) and rye, in that order, were grown in the same pots containing Mn-deficient soil, to which δ-MnO_2 was added in increasing amounts. Oats exhibited severe deficiency symptoms which disappeared on adding 32 ppm. Mn ; straw yields increased from 1·3–22·5 g. per pot and grain yields from 0–10·6 g. Additional Mn caused no further yield increases. Addition of 10, 18 and 32 ppm. reduced the Mn concentration of oats, but higher quantities caused increases. Vetch and rye were unaffected by the soil deficiency and continued to accumulate Mn with increasing additions to the soil. The ability of vetch to extract Mn even from an alkaline soil was outstanding ; rye was more efficient than oats.—J.F.C.

55 Haughs, M. A. and Imper, A. D. **Crop costs.** *Econ. Rep. 65 Enterprise Cost Ser. N. Scot. Coll. Dep. Agric. Econ. 1956* 1957, pp. 9.

Oats and turnips were the crops costed.—M.P.

RYE

56 Minister of Agriculture, Canada. **Winter rye varieties.** *Rep. Minist. Agric. Canada 1955–6*, 1956, 88.

Dominant, from the Netherlands, gave the best yields in Eastern Canada. Dakold and Antelope, the North American varieties, proved to be reliably winterhardy in Western Canada. The tetraploid Petkuser rye from Germany gave a satisfactory performance in Eastern Canada. It is not sufficiently winterhardy for prairie conditions.—D.B.

57 Statens Forsøgsvirksomhed i Plantekultur. Denmark. Forsøg med rugsorter 1952–55. [**Variety trials with rye 1952-5.**] *Medd. 551 Stat. Forsøgsvirk. Plantekult.* [contained in] *Tidsskr. Planteavl* 1951, **61,** No. 1, 179–82.

Trials with 9 winter-rye varieties were carried out at 10 locations. Mean grain yields for Petkusrug Z, Sejet Kaernerug, Borris Perlerug and Petkusrug were 38·7, 38·3, 37·6 and 37·6 hkg. per ha., respectively. Borris Perlerug e. 2/50 was tested for 2 years only and yielded 37·9 hkg. per ha. The Swedish Kongsrug II gave the lowest yield. Details of grain quality, straw length and tendency to lodge are tabulated. Brief descriptions are given of each variety.—J.K.L.

58 Arriaga, H. O. El centeno "Insave F.A.", híbrido sintético resistente a la toxemia del "pulgón verde de los cereales". [**The rye Insave F.A., a synthetic hybrid resistant to greenbug (*Schizaphis graminum*) toxaemia.**] *Rev. Fac. Agron., La Plata* 1956, **32,** No. 2, 191–209, bibl. 4, illus., English summary.

59 Van Dobben, W. H. De resultaten van de interprovinciale veldproeven met gedeelde en zeer late stikstofgiften op wintergranen in 1956. Serie 80 A en B. [**The results of the 1956 interprovincial field trials of nitrogenous fertilizers applied to winter grain crops in instalments, and very late, respectively. Series 80 A and B.**] *Landb Voorl.* 1957, **14,** No. 5, 224–32. [Inst. Biol. Scheik. Onderz. Landbouwgewassen, Wageningen]

In Series A comparison was made of the effect of applying N to rye (a) all in March, (b) one-half in March and one-half in April, and (c) all in April ; and to wheat (a) all early, (b) one-half in March and one-half in May, and (c) all at the beginning of May. The resultant grain and straw yields are tabulated. In Series B the normal early application of N was given to both rye and wheat, plus 20 and 40 kg. N per ha. at the time of earing. For this series data are also given on stiffness of straw, thousand-grain weight and crude-protein content. Very different results were produced in the rye by the late, extra dressing, but the winter wheat was on the whole little affected thereby.—G.M.R.

BARLEY

60 Peers, A. W. **Barley growing in Kenya.** *Kenya Fmr* 1957, July/August, 38–40, bibl. 2.

61 Jahn-Deesbach, W. and Zeitz, E. Die Ergebnisse eines Braugersten-Komplexversuches. Der Einfluss von Drillweite, Saatstärke und Stickstoffdüngung auf Ertrag und Qualität. [**Results of brewing-barley experiments. The effect of row spacing, sowing rate and nitrogen manuring on yield and quality, and their interactions.**] *Z. Acker- u. Pflbau* 1957, **103,** No. 2, 157–80, bibl. 8, illus. [Univ. Farm, Kötschau (Kr. Weimar), E. Germany]

Experiments were conducted with Freya, a good brewing barley. A row spacing of 14·3 cm. was more favourable than one of 20 cm. 30–40 kg. N/ha. gave higher yields than 20 kg. N/ha. The effect of sowing rate was less decisive and was closely bound up with row-spacing and N manuring. With the narrower row spacing and higher N application, a low-to-medium sowing rate of 120–140 kg./ha. was the most satisfactory. With the wider row spacing a higher sowing rate and the heavier rate of N fertilizer were necessary for good yields. To avoid lodging and to obtain barley of good brewing quality as well as high yields, the best combination of these 3 components on a well manured soil was : narrow drill-spacing, medium sowing rate and medium N manuring. Though these cultivation practices influence yield and brewing quality, choice of area for soil and climate and choice of variety have a far greater influence. —D.B.

62 Zweifel, J. and Pugnat, C. L'orge de printemps Ceresia. [**Ceresia, a spring barley.**] *Rev. rom. Agric.* 1957, **13,** No. 5, 33–6, bibl. 9, illus. [Stat. féd. d'essais agric., Lausanne, Switzerland]

The German variety, Ceresia, is superior to Isaria I in grain yield, quickness and regularity of emergence, vegetative development, resistance to *Erysiphe graminis*, resistance to lodging, and earliness in maturing. As a brewing barley, it is slightly superior to Isaria I. Its feeding value is slightly lower. Ceresia was placed on the official list of varieties in the spring of 1957.—D.B.

63 Moseman, J. G. **Evaluation of varieties and selections of barley for disease resistance and winter hardiness in southeastern United States.** *Tech. Bull. 1152 U.S. Dep. Agric.* 1956, pp. 33, bibl. 17.

The data refer to 372 barley varieties and selections from the world collection maintained by the U.S. Department of Agriculture. The varieties were grown in N. Carolina during 1950–4 and characteristics studied included : growth habit, time of heading, winter survival, and reaction to powdery mildew (*Erysiphe graminis*), leaf rust (*Puccinia hordei*), eastern soil-borne viruses and scald (*Rhynchosporium secalis*). A list is given of 32 varieties outstanding for a combination of high winter survival, and resistance to powdery mildew and leaf rust.—P.J.B.

64 Gilbert, S. G. and Blum, P. H. **Microbial factors in barley germination related to dormancy and the development of resistance by barley seeds during germination.**

Suppl. Pl. Physiol. 1957, **32,** xlvii. [Pabst Labs, Milwaukee, Wis.]

65 Reinbergs, E. and Huntley, D. N. **Some factors affecting hull adherence in barley.** *Canad. J. Pl. Sci.* 1957, **37,** No. 3, 262–73, bibl. 14, illus. [Ontario Agric. Coll., Guelph]

The effects of stage of maturity and methods of drying after cutting, on hull adherence were evaluated on different varieties of barley by determining their susceptibility to hull damage when exposed to rough handling, and by observing the percentage of abnormally projecting acrospires [shoots] in subsequent germination. The percentage of kernels with hull damage and with abnormal acrospire growth in subsequent germination in the 3 varieties tested, G.B. 19, Montcalm, and O.A.C. 21, were highest when they were harvested late, i.e. when ready for combining, and lowest when harvested early, i.e., the middough stage. When dried in the field in uncovered stooks there was a significantly higher percentage of both damaged kernels and abnormal acrospire growth than when dried in the barn or in the field covered by canvas or capped with sheaves. Significant differences in susceptibility to damage and abnormal acrospire growth were associated with differences in locations and varieties. In these tests a highly significant positive correlation was found to exist between hull damage and abnormal acrospire growth. However, some notable exceptions occurred, suggesting that the seed coat as well as the hull of the barley kernel is an important factor in obtaining normal acrospire growth during germination. A relatively simple method of evaluating hull adherence in barley varieties is described.—Authors' abstract.

66 Löhr, Erika. Das verhältnis von Chlorophyll a/b bei vollgedüngten und stickstoffmangelnden Pflanzen. [**The chlorophyll a : b ratio in fully manured and N-deficient plants.**] *Experientia* 1957, **13,** No. 5, 189–90, bibl. 6, English summary. [Pl. Physiol. Lab., Univ. Copenhagen, Denmark]

The ratio of chlorophyll a : b was 3·2 in N-deficient, and 2·9 in fully manured plants of Ymer barley.—From summary.

67 Coey, W. E. and others. **The value of discard rows in field experiments with barley.** *Res. exp. Rec. Minist. Agric. N. Ire. 1955* 1957, **5,** 7–11, bibl. 5.

Yard lengths of rows from outer and inner rows in plots were harvested separately in a field experiment with barley. The results indicated that the difference in yield between outer and inner rows was not constant but was affected significantly by both variety and seed rate. It was apparent that in the experiment the true effect of the various treatments could only be obtained where the outer rows were harvested separately and discarded.—Authors' summary.

MAIZE

68 Vlora, A. K. Sintesi di una geografia del mais. [**Synopsis of the geography of maize.**] *Universo* 1956, **36,** No. 2–4, pp. 23, bibl. in text, illus.

This world review of maize is concerned with environment, geographical distribution, production and trade.—E.B.O.

69 Bulletin Technique d'Information. Aperçu sur la culture du maïs en Italie et en Suisse. [**An outline of maize-growing in Italy and Switzerland.**] *Bull. tech. Inform.* 1957, No. 119, 239–54, illus.

70 Glover, J. **The relationship between total seasonal rainfall and yield of maize in the Kenya Highlands.** *J. agric. Sci.* 1957, **49,** Pt 3, 285–90, bibl. 4, illus. [E. Afr. Agric. For. Res. Org., Muguga, Kenya]

A study of the climate within the maize-growing areas of the West Rift area of the Kenya Highlands showed that rainfall is the major meteorological variable. Further, the average yields of maize in subdistricts within the region are markedly affected by changes in seasonal rainfall and are apparently unaffected by large changes in acreage sown from year to year over a period of 11 years. Yield of maize rises with increasing total rainfall in the growing season up to a maximum ; thereafter as rainfall totals further increase, yield decreases. The relationship may be expressed by a curve of the form $Y = Ax^{be^{-ax}}$, where Y is yield, x is rainfall and A, b and a are constants. [See also *Fld Crop Abstr.* 9 : 1027.]—From author's summary.

71 Willis, W. O. and others. **Corn growth as affected by soil temperature and mulch.** *Agron. J.* 1957, **49,** No. 6, 323–8, bibl. 16, illus. [Iowa Agric. Exp. Sta., Ames]

Maize was grown to a height of 38 cm., in a greenhouse at soil temperatures of 60, 69 and 76°F. and to maturity in a field, where the soil temperature was controlled, using underground heating cables. With increase in soil temperature, emergence was hastened and earliness promoted ; the growth rate, measured as height with leaves extended, was almost linear over 60–80°F. and closely followed van't Hoff's law, the $Q_{10°C.}$ of which is 2–2·8. The period between tasseling and silking was prolonged 2–4 days by a straw mulch, but reduced by raising the soil temperature. The best soil temperature at the 4-in. depth for maize growth in central Iowa appeared to be *c.* 75°F.—J.F.C.

72 Letey, J. and Peters, D. B. **Influence of soil moisture levels and seasonal**

weather on efficiency of water use by corn. *Agron. J.* 1957, **49**, No. 7, 362–5, bibl. 4, illus. [Illinois Agric. Exp. Sta., Urbana]

Three moisture levels (no rainfall, rainfall, and rainfall + irrigation) were established in field plots on a deep permeable Brunizem soil in which maize was sown. The data on soil water, weather, and yields showed : (1) the importance of a subsoil-moisture reserve at the beginning of the season, (2) the need for a moisture level well above 15 atm., and (3) the need for irrigation of deep-rooted crops only when water becomes severely depleted in the upper 2 ft. of soil. Total water consumption could not be used as an indicator of maize yields.—From authors' summary.

73 Vélez, J. E. Interpretación matemática de diez sistemas de siembra con maíz híbrido. [**Mathematical interpretation of ten sowing methods with hybrid maize.**] *Rev. argent. Agron.* 1957, **24**, No. 1–2, 47–54, bibl. 9. [Fac. Agron., Univ. La Plata, Argentina]

In a study to compare 10 methods of sowing maize, that which allowed 0·5 m. between groups of 2 plants in the row, and 1 m. between the rows, gave the highest yields.—E.B.O.

74 Grant, U. J. and others. Cómo aumentar la producción del maíz en Colombia. [**How to increase maize production in Colombia.**] *Bol. Divulg. 1 Minist. Agric. Colombia* 1957, pp. 51, bibl. in text, illus.

75 Eschenwald, A. and others. La producción comercial del maíz en Puerto Rico. [**The commercial production of maize in Puerto Rico.**] *Bull. 134 Esta. exp. agric. Río Piedras, Puerto Rico* 1956, pp. 15, illus., English summary.

The recommendations given on the growing of maize in Puerto Rico are the results of field trials carried out at the Lajas Agricultural Experiment Substation.—From authors' summary.

76 Wolfe, Miriam and Fowden, L. **Composition of the protein of whole maize seeds.** *Cereal Chem.* 1957, **34**, No. 4, 286–95, bibl. 20. [Dep. Bot., Univ. Coll., London]

The complete amino-acid composition of the grain protein of 7 varieties of maize was determined. Considerable differences between the varieties were found.—From authors' abstract.

77 Linden, G. Chemische Unkrautbekämpfung im Mais. [**Weed control in maize.**] *Mitt. biol. BundesAnst. Berl.* 1957, **87**, March, 68–73, bibl. 27. [C. H. Boehringer, Ingelheim/Rein, Germany]

In 3 years' trials, 2,4-D (amine) and MCPA (Na) were each applied at 1 and 1·5 kg. in 800 l./ha. to 5 maize varieties when the crop was 10–20 cm. high. Yields were higher from the 2,4-D than from the MCPA treatments.—M.P.

78 Rosher, P. H. **A report on work with herbicides at the Imperial College of Tropical Agriculture, Trinidad, British West Indies.** *Pest. Abstr. Sect. C.* 1957, **3**, No. 3, 150–60, bibl. 3.

This article, the first of a series summarizing the results of the experiments conducted to date, reports trials on the response of maize to pre-emergence and post-emergence applications of various herbicides.—M.P.

79 Luckmann, W. H. and Petty, H. B. **Controlling corn borers in field corn with insecticides.** *Circ. 768 Coll. Agric. Univ. Illinois* 1957, pp. 8.

Results are tabulated for the field control of the European corn borer [*Pyrausta nubilalis*] during 1947–50 and '56. DDT was applied at 1–1·5 lb./ac. by ground spraying or aerially as granules. Control averaged 68%, but where application was well-timed, 90% control was obtained. The average saving in yield ranged from 5·5–8·3 bu./ac. of No. 2 shelled corn.—J.F.C.

80 Estrada, F. A. Combate del gusano cogollero del maíz (*Laphygma frugiperda* S. and A.) por medio de insecticidas en Nicaragua. [**Control of the fall armyworm (*L. frugiperda*) on maize in Nicaragua by insecticidal treatment.**] *Turrialba* 1956, **6**, No. 3, 53–8, bibl. 2, illus., English abstract. [La Calera Agric. Exp. Sta., Managua, Nicaragua]

In trials to test several preparations for the control of the fall armyworm on maize, 40% methyl parathion, applied at the rate of 8 oz. per manzana [1·727 ac.] was best because of its rapid action, and a kill of over 90%. Its application is recommended for areas of frequent rains. DDT and dieldrin, which had a slower action, but a longer residual effect, than parathion, can be used under dry weather conditions.—E.B.O.

81 Ruppel, R. F. and others. **Chemical control of the fall armyworm, *Laphygma frugiperda* (S.), in maize in Colombia.** *F.A.O. Pl. Prot. Bull.* 1957, **5**, No. 5, 69–73, illus., bibl. 1. [Rockefeller Found., Medellin, and Dep. Agric. Res., Colombia]

In field trials at Palmira and Medellin the comparative effects of 3 applications to young maize of different insecticides were tested in controlling the budworm form of *Laphygma frugiperda*. The treatments were carried out when the plants were 20–30 cm., 50–60 cm. and 1 m. high. Sprays of toxaphene at 2 kg./ha., aldrin and isodrin at 0·5 kg./ha., endrin and parathion at 0·25 kg./ha. were equally effective. At Palmira, the untreated plots were either lost or so stunted that they yielded nothing. At Medellin the average yield of treated plots was 29% higher than the untreated. Aldrin and isodrin were slightly phyto-

toxic but did not reduce yields. Aldrin was used in the highlands of Colombia to control the budworm form of *Dargida gramivora*, which attacks maize that is more than 1 m. high.—J.K.L.

82 ORTEGA, C. A. and others. La araña roja del maíz (*Paratetranychus stickneyi* McG.), un estudio de su biología y combate en Jaloxtoc, Morelos. [**Red spider of maize (*Paratetranychus stickneyi*), a study of its biology and control in Jaloxtoc, Morelos (Mexico).**] *Foll. tec. 21 Sec. Agric. Ganad., Mex.* 1957, pp. 28, bibl. 2, illus., English summary.

Of the preparations tested, only ethylic parathion wettable powder is recommended for controlling *P. stickneyi* on maize. It should be used at the rate of 1 kg. actual in 800 l. of water per ha. on young maize plants.—From authors' summary.

83 URANO, K. and others. **Studies on the ear differentiation of corn [maize] plant.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **25**, No. 3, 163–4, bibl. 7, illus., English summary. [Nagano Agric. Exp. Sta.]

84 PETINOV, N. S. and IVANOV, V. P. [**The effect of short day during the sprouting period on the water regime and acceleration of development in maize.**] [Russian] *Fiziol. Rast.* (*Pl. Physiol. USSR*) 1957, **4**, No. 2, 171–82, bibl. 39, illus., English summary.

Young average-maturing varieties of hybrid maize P-3 and F-2271 were subjected (during 13 days in 1955) to the action of a short 10-hr. day. The plants (which were grown near Moscow) developed 7–8 days earlier compared with plants grown under natural conditions, and no decrease in growth was observed. When the short-day treatment was increased from 13 days to 28 days (in 1956) an even greater acceleration in development was observed (12–13 days instead of 7–8 days) but in this case growth was decreased by more than 30% compared with the natural-day plants. Late varieties of maize (Sterling or Krasnodarskaja 1/49) are less susceptible to the action of shortening the day when compared with the average maturing varieties P-3 or B-271 ; the Partisan variety is also sensitive to shortening day-length in regard to acceleration of development but growth and the accumulation of vegetative mass decrease only slightly. The water relations in maize were also affected by the short-day treatment. The magnitude of the suction pressure in the cells, concentration of cell sap and osmotic pressure all increased, whereas the amount of free water decreased. These facts indicate that, compared with natural-day plants, the water content of the cells is lower. This circumstance leads to a certain decrease in the vegetative period in general and to accelerated development in particular.—From authors' summary.

85 BUIS, R. Action de faibles concentrations de coumarine et d'hydrazide maléique sur le développement du maïs. [**Effect of weak concentrations of coumarin and maleic hydrazide on maize development.**] *Rev. gén. Bot.* 1956, **63**, No. 743, 29–37, bibl. 22, illus.

The absorption by the leaf of weak concentrations of coumarin (10, 50 and 100 ppm.) and MH (50 ppm.) did not appreciably modify growth and seed formation in maize but stimulated tillering ; the secondary tillers sometimes flowered and formed seeds.—E.B.O.

86 CARLES, J. and others. Répartition des éléments minéraux dans le maïs au cours de sa végétation. [**Distribution of mineral elements in maize during its growth.**] *C.R. Acad. Agric. Fr.* 1957, **43**, No. 10, 532–6, illus.

This study was carried out with hybrid maize, Iowa 4 417, grown at a density of 5 plants per sq. m. on alluvial, manured soil in the lower Garonne valley. The average dry weight of a plant at harvest was 220 g., 48% of which was in the grain. The results are given from chemical analyses of grains, stem, leaves, cob and other parts of the plant, at different stages of growth. A maize plant at harvest was found to contain, on average, 1950 mg. N, 370 mg. P, 1250 mg. K, 130 mg. Na, 540 mg. Ca and 335 mg. Mg. The grains had a high content of N, P and Mg but were low in Ca. The Ca accumulated in the leaves, Na and K in the stem and ear.—E.B.O.

87 CARLES, J. and others. Influence d'une fourniture plus ou moins abondante d'engrais azotés sur la pénétration et la migration des éléments minéraux chez le maïs. [**Influence of a more or less abundant application of N fertilizers on the penetration and migration of mineral elements in maize.**] *C.R. Acad. Agric. Fr.* 1957, **43**, No. 10, 536–44, bibl. 4, illus.

In the trials described, carried out on alluvial soil in the lower Garonne valley, the following amounts of N fertilizer were applied to the maize hybrid Iowa 4 417, in kg./ha. : 0, 40, 80 (optimum amount) and 160. The average dry weight of a plant at harvest, for each manurial treatment, was 58, 171, 236 and 301 g., respectively. The proportion of these dry weights was determined in, and the absorption and migration of K, Na, Ca, Mg, P and N were examined in, different parts of the plant and at different stages of growth, in relation to the amounts of N applied. It is concluded that the uptake of mineral elements in maize is dependent on growth, which, in turn, is dependent on the amount of N found in the soil by the plant as the uptake of this element is rapid. The other elements have a slower effect but they become limiting factors if their uptake is below a certain level. In particular, high amounts of N in the

soil may cause a deficit of P which will limit grain yields.—E.B.O.

88 KAHN, J. S. and HANSON, J. B. **The effect of calcium on potassium accumulation in corn [maize] and soybean roots.** *Pl. Physiol.* 1957, **32**, No. 4, 312–6, bibl. 16, illus. [Agron. Dep., Univ. Illinois, Urbana]

89 SCHARRER, K. and JUNG, J. Der Einfluss unterschiedlicher Zinkgaben auf das Wachstum und die Naehrstoffaufnahme von *Zea mays* und *Vicia faba*. [**The influence of different rates of Zn application on the growth and nutrient uptake of *Z. mays* and *V. faba*.**] *Agrochimica* 1956, **1**, No. 1, 23–34, bibl. 10, illus., German, French, English, Spanish and Italian summaries. [Agrikulturchem. Inst. Justus Liebig-Hochschule Giessen]

Seedlings of maize and *V. faba* were grown in culture solutions to which Zn (as $ZnSO_4$) had been added at 0, 0·25, 2·5 or 25 mg. in 5 l. of solution. In the absence of Zn, maize showed reduced growth, shortened internodes, chorophyll deficiencies and pigmentation changes. At 0·25 mg. Zn, growth was normal ; the higher concentrations had no adverse effects on growth. In *V. faba*, Zn deficiency was not marked ; 0·25 mg. Zn increased plant growth, but higher concentrations were toxic. Zn uptake was higher in *V. faba* than in *Z. mays*. When the plants were harvested before flowering and analysed for macro- and micro-element content, the Zn concentration of plants grown in the 4 solutions were *c.* 21, 23, 80 and 128 ppm. for maize, respectively, and *c.* 51, 40, 121 and 353 ppm. for *V. faba*, respectively. The uptake of the other elements appeared to be related to the Zn concentrations of the solution.—M.P.

90 RAY, H. E. **Studies on the uptake of nitrogen by corn as influenced by nitrogen fertilization and the movement of labelled nitrogen in the soil.** *Diss. Abstr.* 1956, **16**, No. 10, 1770. [Univ. Minnesota]

91 BAPTISTA, J. G. and others. Acerca da amostragem em ensaios de milho para a determinação da humidade do grão. [**On sampling in maize trials for the determination of grain-moisture content.**] *Melhoramento* 1955, **8**, 5–21, bibl. 4, English summary. [Esta. Melhor. Plantas, Elvas, Portugal] [Received Feb., 1957]

92 BALINT, A. and KOVÁCS, A. Vizsgálatok a kukorica fehérjetartalmának fokozására. [**Research on increasing the protein content of maize.**] *Agrar. Egyet. Agron. Kiad.* 1956, **3**, No. 5, 1–15, bibl. 15, Russian and German summaries. [Hungary]

This study was initiated in 1953 with the object of increasing the protein content of maize varieties by 2–4% above that of the existing types. Percentage crude-protein content was determined in 18 maize strains growing under 17 different ecological environments in Hungary. Between varieties there was a difference of 3·3% while in a single variety grown in different localities the difference was 5%. The tests made to increase protein content by means of specific fertilizers (including boron) gave no significant results. There is evidence that greater success may be achieved by means of hybridization, notable with *Euchlaena*.—M.H.

93 RAHEJA, P. C. and others. **Fertilization investigations in maize (*Zea mays*).** *Indian J. Agron.* 1957, **1**, No. 4, 221–35, bibl. 28, illus. [Indian Agric. Res. Inst., New Delhi]

The maize crop showed a response to N but a very low response to phosphate fertilizer. Drilling of fertilizers at 2·5 and 4·5 in. below seed level was compared with broadcasting the fertilizer ; shallow drilling, i.e. at 2·5 in. below seed level, gave the highest yields. 30–60 lb. N-fertilizer per ac. gave a significant increase in yield of a following oat crop but the residual effect of P_2O_5, at 40–120 lb./ac., was very low.—D.B.

94 ROBERTSON, K. W. and others. **Results from subsoiling and deep fertilization of corn for 2 years.** *Proc. Soil Sci. Soc. Amer.* 1957, **21**, No. 3, 340–6, bibl. 16. [Florida Agric. Exp. Sta.]

Lime, fertilizer, fertilizer + lime, and fertilizer + lime + minor elements placed in the subsoil were compared with subsoiling alone and surface fertilization at low and high rates on 6 soil types in North and West Florida. Maize yields, root distribution and the chemical composition of ear leaves were used to measure responses. With organic hard-pans, yield increases were obtained from subsoiling alone and from deep placement. With clay pans and short drought periods, subsoiling and deep placement raised the yields compared with surface placement, but not when the drought exceeded 25 days. Where there was no pan, surface fertilization was as good as deep placement and subsoiling alone was of no benefit.—From authors' abstract.

95 CABRAL, A. Secagem de cereais. Notas de uma visita a França e a Espanha. [**Cereal drying. Notes on a visit to France and Spain.**] *Bol. Com. reg. Cer. Açores* 1956, **12**, No. 24, 1–40, illus., English and French summaries.

This article is concerned mainly with the drying of maize for seed.—E.B.O.

96 RHODESIA AGRICULTURAL JOURNAL. **Fifth annual report of the Sabi Valley Experiment Station—1955-56.** *Rhod. agric. J.* 1957, **54**, No. 4, 337–63, illus.

Maize. Cropping trials on a subsoil indicated that with careful handling for a few years, subsoils

can be used for the irrigated cultivation of maize and other crops. In fertilizer trials, maize yields were higher when at least 30 lb. N/ac. were applied at sowing and again when the crop was knee high, than when applied at either stage only. N appeared to be more beneficial when banded at the knee-high stage than when broadcast. Interplanting maize with sunnhemp at the time of the last cultivation of the maize crop did not significantly depress yields, whereas interplanting at sowing reduced the yield of maize very considerably.—M.P.

97 SWAINE, G. **Trials on the underground storage of maize of high moisture content in Tanganyika.** *Bull. ent. Res.* 1957, **48,** No. 2, 397–406, bibl. 6, illus. [Dep. Agric., Tanganyika]

Trials were carried out at 2 places in Tanganyika on the underground storage of maize in sealed pits. The average moisture content of the maize when placed in the 2 pits was 16·9 and 14·8%, whilst the general level of insect infestation was very light and fairly light, respectively. The predominant species was *Calandra oryzae*. The maize was kept in the sealed pits for 144 and 374 days, respectively. The examination of samples taken at intervals showed that the insect infestation died out early and that there was no increase in insect damage. As other changes, unconnected with insect infestation, took place, conditioning and admixture of a more palatable maize was necessary before the grain from the pits could be offered to the public. It is concluded that long-term underground storage of maize of high moisture content is not practicable under tropical conditions owing to the deterioration that occurs in the grain.—From author's summary.

98 MONZÓN, D. Análisis e interpretación de un ensayo de uniformidad con maíz. [**Analysis and interpretation of a uniformity trial with maize.**] *Agron. trop., Maracay* 1956, **6,** No. 1, 15–22.

SORGHUM AND MILLETS

99 BACSA, P. A seprücirok bugák rendellenes fejlödésének okai. **Anomalous growth of broom-corn panicles.** *Növénytermelés* 1957, **6,** No. 1, 91–4, bibl. 7, illus., English and Russian summaries. [Exp. Farm, Bánkút, Medgyesegyháza, Hungary]

Anomalies in panicle form (illustrated) impair the value of *Sorghum vulgare* var. *technicum* for industrial purposes. The results of 2-yr tests on the effect of cultural practices on panicle type indicate that crops with first-class panicles are obtained when there is a mean soil temperature of 18·9°C. during the period from shooting to panicle emergence. It is recommended that broom corn should be grown only in those parts of the country where these temperature conditions prevail. Fertilized plots produced longer and better-quality panicles than untreated plots. On the evidence of the 2-years' average, the application of ammonium nitrate broadcast each year in the spring, resulted in 11% more first-rate panicles.—From summaries.—M.H.

100 BERGERET, P. W. and FERNÁNDEZ, P. W. Estudio de diversas variedades de sorgo azucarado y sus posibilidades alcoholígenas. [**A study on several varieties of sugar sorghum and their possibilities for alcohol production.**] *Rev. Asoc. Ing. agrón., Montevideo* 1956, **25,** No. 99, 17–36, bibl. 5.

To study the possibility of using sugar sorghum as a raw material for the production of industrial alcohol, 17 sugar sorghum varieties from the USA were grown experimentally under field conditions in Uruguay. The best were White African, Honey (Texas) T.S. 21001 and Axtell which yielded 35,300, 34,200 and 32,450 kg. of stems (1271, 1539 and 1421 l. 100° alcohol) per ha. respectively. The quantity of alcohol per ha obtained from sugar sorghum is almost 3 times that obtained from maize.—E.B.O.

101† POPESCU, C. Studiul soiurilor de sorg zaharat pentru nutreţ. [**Study of varieties of sugar-sorghum for fodder.**] *Anal. Inst. Cerc. agron. Român* 1956, **23,** 159–77, bibl. 5, illus. French and Russian summaries. [Inst. Agron. Res., Bucharest]

In 1949, studies of *Sorghum saccharatum* were initiated, using local varieties and varieties obtained from the USSR and Italy. The 1951–3 data on 4 foreign and 5 local varieties are tabulated as regards panicle, glume and grain characters, growth period, yields of grain and green fodder and their proximate constituents. The varieties were classified according to maturity, habit and type of panicle. The local lines were superior to the foreign in quality and quantity of green fodder. The average yield of the local Line No. 4 was 23,546 kg./ha. of green fodder and 2099 kg./ha. of sugar. The average grain yield of Line 1 was 1937 kg./ha. and its grain was superior in its starch content (914 kg./ha.) and in fats (61 kg./ha.). Early Amber, Kansas Orange and Line 4 were recommended for grain, green fodder and silage. Minnesota Black, Minnesota Red and Line 1 were recommended for grain.—From author's summary

102† GOODSELL, S. F. **Germination of dormant sorghum seed.** *Agron. J.* 1957, **49,** No. 7, 387–9, bibl. 4, illus. [Seed Test. Lab., Pioneer Hi-bred Corn Co., Johnston, Ia]

A small laboratory scarifier was unsuitable for large-scale use on dormant sorghum seed and other types of scarifier were unsatisfactory because of seed loss through cracking. Soaking in water a

70°C. for 4 min. gave 80% germination and satisfactory field stands.—J.F.C.

103 De Pew, L. J. **Control of corn earworm in sorghum heads by aerial spraying in southwestern Kansas.** *J. econ. Ent.* 1957, **50**, No. 2, 224–5, bibl. 2. [Kansas Br. Agric. Exp. Sta., Garden City]

In aerial spray tests for the control of *Heliothis zea* in the heads of grain sorghum, phosdrin, applied at 0·5 lb., actual, per ac., was best and gave 95 and 100% control after 1 and 4 days, respectively.—From author's summary.

104 Sikka, S. M. and others. **Pistil-less off-type plants in bajra (*Pennisetum typhoides* Stapf and Hubbard).** *Curr. Sci.* 1957, **26**, No. 4, 114. [Div. Bot., Indian Agric. Res. Inst., New Delhi]

105 Iyengar, K. G. and Lakshmaniah, C. H. **Aruna, an improved variety of irrigated ragi.** *Mysore agric. J.* 1957, **32**, No. 1, 29–32, illus. [Agric. Res. Sta., Mandya]

As a result of *Eleusine coracana* selection trials, the best variety, Aruna, has been released as a summer crop. This early variety has produced 2200 lb. grain/ac. It is 2–3 ft. high and does not tiller unless widely spaced. The great advantage of this variety is that its ears ripen uniformly and 90% of its grain can be harvested at the first cutting. Early harvesting is essential if loss of grain, due to brittleness of ear-stalk, is to be avoided. It should be transplanted before the seedlings are 20 days old and spaced at 3–4 in. between plants in rows 9–10 in. apart.—D.B.

RICE

106 Piacco, R. Temperatura dell'acqua in rapporto all'altezza. [**Temperature of water in relation to its depth.**] *Riso* 1957, **6**, No. 3, 14–16. [Sta. Sper. Risicolt., Vercelli, Italy]

In the Italian rice-fields the depth of the irrigation water is generally 10–12 cm. from sowing to harvest (during this period the fields are drained at particular times). Observations were made from 26 April to 25 May on the water temperature in 3 compartments of a rice-field in which the water depths were 5, 10 and 20 cm., respectively. It was found that the average daily temperature varied only a fraction of a degree C. in relation to the depth of the water, the monthly averages being practically the same (19·23°, 19·24° and 19·22°C. for 5, 10 and 20 cm., respectively). The daily maximum and minimum temperatures showed variations of up to 1°C. in relation to depth, the maximum temperatures being generally higher, and the minimum temperatures lower, in the compartment with shallower water than in those of greater depth.—E.B.O.

107 Poli, P. Esperimento di coltura di riso con irrigazione a pioggia. [**A rice trial using sprinkler irrigation.**] *Riso* 1957, **6**, No. 2, 12–14, illus.

The results from a limited trial carried out in Sardinia, in which rice was sprinkler-irrigated, indicated that it is possible to grow rice by this method. The yield obtained from a 900 sq. m. plot of poor soil was equivalent to 2500–3000 kg. of grain per ha.—E.B.O.

108 Bouyer, S. and others. Réponse du riz à la fumure en riziculture aquatique au Sénégal (Richard-Toll). [**Response of swamp rice to manuring in Senegal (Richard-Toll).**] *Riz et Rizicult.* 1957, **3**, No. 2–3, 60–4, bibl. 4, English and Spanish summaries.

Information is given on climate, soils and cultural methods. The seed is drilled. The land is flooded immediately after, drained a week later, flooded again after seedling emergence and drained after earing. The varieties grown are Dissi (non-photosensitive) and Sossoka (photosensitive). In manurial trials, the highest increases in yield were obtained by applying 35–40 kg. N/ha.—E.B.O.

109 Chateau, R. L'utilisation de l'avion en riziculture à Richard-Toll. [**The use of the aeroplane in rice cultivation at Richard-Toll (Senegal).**] *Riz et Rizicult.* 1957, **3**, No. 1, 11–13, bibl. 3, illus., English and Spanish summaries.

As a result of trials at Richard-Toll (4000 ha.) in 1956, sowing by aeroplane, although feasible, is not recommended. On the other hand, the application of fertilizers and herbicides by this method was entirely satisfactory.—From author's summary.

110 Dobelmann, J.-P. Bilan des progrès rizicoles dans les secteurs de la Basse-Betsiboka. [**Progress in rice-growing in the region of the Lower-Betsiboka.**] *Bull. Madagascar* 1957, **7**, No. 133, 528–42.

Information is given on rice-growing in the region of the Lower-Betsiboka, Madagascar, with an account of results obtained at Marovoay Agricultural Station. The principal aspects considered are : varieties, yields, production of selected seed, and transplanting. Vary lava Marovoay 47, Ali Combo and P.56 are high-quality varieties. Kalila 50, Vary kary, Kiriminy and Telovolana are common varieties. In varietal trials in 13 localities, the following average yields, in kg./ha., were obtained : Ali Combo 3957, Kalila 3891, P.56 3746 and Vary lava 2901. The varieties Ali Combo and P.56 are resistant to sun-cracking. By sowing in nurseries in mid-March to mid-May, 30-day-old plants are available for transplanting. Most varieties, e.g. Ali Combo, give their highest yields when transplanted at this age. Others,

such as Kalila, can be transplanted with good results up to the age of 60 days. [See also *Fld Crop Abstr.* 10 : 947.]—E.B.O.

111 PATRUCCO, G. Risicoltura in Venezuela. **[Rice-growing in Venezuela.]** *Riso* 1957, **6**, No. 5, 3–6, illus.

112 VARGAS, M. J. Estudio sobre densidad de siembra del arroz en Tingo María. **[A study on seed rate for rice at Tingo Maria.]** *Bol. trim. Exp. agropec., Lima* 1956, **5**, No. 1, 6–10. [Esta. Exp. Agríc., Tingo María, Peru]

Rice is an important crop in the mountains of Peru, where it is grown without irrigation. As a result of 3 years' trials (1953–5), in which rice was sown in rows 30 cm. apart, it is recommended that rice be sown at the rate of 40 kg. of seed per ha.—E.B.O.

113 ANGLADETTE, A. Notes sur la riziculture indonésienne. **[Notes on rice-growing in Indonesia.]** *Riz et Rizicult.* 1957, **3**, No. 2–3, 103–19, bibl. 40, illus., English and Spanish summaries.

114 WATSON, R. **Rice production in the South Pacific region.** *Tech. Pap. 97 S. Pacif. Comm.* Noumea, New Caledonia, 1956, pp. 62. [Received May, 1957]

The results are presented of a regional survey of the current production and potentialities for increased production of rice in the South Pacific. The regions surveyed include : New Caledonia, New Hebrides, British Solomon Islands Protectorate, Papua, New Guinea, Netherlands New Guinea and Fiji.—P.J.B.

115 KANDA, M. and KAKIZAKI, Y. **Studies on the spacing density with rice plant. 1. Density effect on yield and intraspecific competition.** [Japanese] *Bull. Inst. agric. Res., Tôhoku* 1956, **8**, No. 2, 73–90, bibl. 14, illus., English summary.

A series of experiments was conducted to examine the influence of spacing density, stage of growth, and N-supply on yield and intraspecific competition. At transplanting there was a linear relationship between density and yield (dry weight/unit area) ; with increasing growth stages the relationship was asymptotic. Competition was evident in dense populations shortly after the end of tillering and occurred progressively later in populations of decreasing density. With fall in N-supply, competition became more acute.—From authors' summary.

116 RISO. Classificazione del riso in Birmania. **[Rice classification in Burma.]** *Riso* 1957, **6**, No. 6, 8–10.

117 PADMANABHAN, S. Y. **Preserving viability of rice seeds with fungicides.** *Indian Phytopath.* 1956, **9**, No. 1, 44–7, bibl. 3.

Two trials were carried out, one in 1948 (10 varieties) and the other in 1949 (12 varieties), to study the effect of fungicidal treatment of rice seeds on the preservation of their viability in storage, especially during the monsoon season (July-Oct.). Seed viability was tested monthly from Feb. to Sept. in 1948 and in Apr., June, Aug. and Oct. in 1949. Of the fungicides tested, used at 1/250, 1/500 and 1/750 the weight of seeds, cuprocide at 1/500 was the most effective in preserving viability. Certain superfine varieties of rice with thin long grains and finely pointed ends lost their viability very rapidly with storage during the monsoon period, and even the best fungicidal treatment was only partially helpful in slowing down the rate of their deterioration in viability. The viability of other types of rice was preserved more or less unimpaired under the most effective fungicidal treatments until the end of September or October.—From author's summary.

118 PROVAGLIO, G. Distruzione del giavone con la calciocianamide. **[Control of *Panicum* spp. by calcium cyanamide.]** *Riso* 1957, **6**, No. 3, 6–9, illus.

Trials carried out in Italy during the last 3 years showed that calcium cyanamide is the most effective and cheapest herbicide for controlling *Panicum* spp. in rice-fields. Calcium cyanamide destroys other weeds besides those of the genus *Panicum* and many pests, and has no residual toxicity in the soil. [See also *Fld Crop Abstr.* 9 : 80.]—E.B.O.

119 KOL, E. **Comparative algological and hydrobiological studies in rice fields in Hungary.** *Acta Bot. Acad. Sci. Hung.* 1956, **2**, No. 3/4, 309–63, bibl. 37, illus., Russian summary.

Results are given of studies covering the period 1950–3, involving rice fields of different geographical location and soil type, and utilizing irrigation water of varying pH. The microbiocoenosis of rice fields has two micro-associations, that of the water and that of the soil. The biocoenosis of aquatic biotopes is restricted during 4–6 months while irrigation water covers the fields, and the micro-vegetation is that of stagnant water, even though the irrigation water is flowing. The water over the rice (the temperature of the water being a function of the air temperature) is dependent on the quality of the irrigation water and the soil conditions. The pH of the irrigation water varies between 7 and 9 and has an effect on both micro- and macro-flora ; *Gloeotrichia natans*, for example, occurs when pH ranges between 7·4 and 8·5. This alga constitutes an enormous mass of vegetation in Hungarian rice fields, but is less damaging to the rice crop than are *Cladophora fracta* and *Rhizoclonium hieroglyphicum*, which form " blanket algae " and are typical of the alkaline

waters in Hungary. Plankton forms a considerable part of the micro-association in the water and the role of associations epiphytic on the macro-vegetation is also significant. Each type of macro-vegetation has its typical micro-vegetation, the latter being subject to seasonal changes. In summer the Cyanophyta are prolific. After the irrigation water is drawn off, various species of *Euglena* form waterblooms in residual puddles. When these puddles dry, the aquatic micro-vegetation is replaced by one which is aerophytic. The factors which determine the formation of algal vegetation in rice fields include : original plant cover, irrigation water, birds, wind, type of rice seed used, fertilizers, and biotic agencies. Blue algae benefit the rice plant by fixing atmospheric nitrogen.—From author's summary.

120 Chateau, R. La flore adventice des rizières. [**The weeds of rice-fields.**] *Bull. agric. Congo belge* 1957, **48**, No. 3, 561–80, bibl. 26, illus. [Casier Exp. Richard-Toll, Senegal]

This is a world review. The weeds are grouped by families.—E.B.O.

121 Ingebretsen, K. H. and others. **Weeds in drained rice fields.** *Calif. Agric.* 1957, **11**, No. 7, 5, 15.

For the control of *Cyperus* sp. and other weeds in rice, sprays were tested 38 days after sowing, instead of after the customary 55–65 days. MCPA and 2,4-D were each applied by aeroplane at 18 oz. a.e. in 10 gal. water/ac. to the drained field and flooding of the field was started immediately after spraying. Control by MCPA was excellent and there was less injury to rice than with 2,4-D ; compared with the control, the grain yield was raised from 3,667–6,430 lb./ac. Spraying MCPA at 10 oz./ac. with a ground rig after draining, when the rice was 7–8 in. high, raised the yield from 2200–4450 lb./ac.—J.F.C.

122 Malaguti, G. Posibilidad de control biológico de dos malas hierbas mediante hongos. [**Possibility of the biological control of two weeds by fungi.**] *Agron. trop., Maracay* 1956, **6**, No. 1, 23–6, bibl. 4, illus.

Echinochloa colonum and *Panicum fasciculatum* are the most noxious weeds of rice and maize in the western Llanos of Venezuela. In rice-fields in different localities some seeds of both weeds were found affected by fungi ; these seeds could not germinate. The rice plants did not appear to be affected by the fungi. The fungus affecting *E. colonum* was identified as *Ustilago sphaerogena* and that affecting *P. fasciculatum* as *Ustilaginoidea virens*. —E.B.O.

123 Penny, J. M. Combate racional e constante do capim arroz. [**Rational and constant control of *Echinochloa crus-galli*.**] *Lavour. arroz.* 1957, **11**, No. 123, 22–5. [Esta. Exp. Arroz, Gravataí, Brazil]

The method recommended for controlling *Echinochloa crus-galli* in Brazilian rice-fields is : during September-January, the land should be tilled and one irrigation given to encourage the germination of seeds of *E. crus-galli* and other weeds; before the weeds flower they are ploughed under. A legume can be grown for green manure after the first cultivation and ploughed under with the weeds.—E.B.O.

124 Amaral, J. K. and others. Principais invasoras dos campos e lavouras de arroz do Rio Grande do Sul. [**Principal weeds of rice-fields in Rio Grande do Sul (Brazil).**] *Lavour. arroz.* 1957, **11**, No. 127, 234.

A list is given of the principal weeds together with their resistance, or susceptibility, to 2,4-D.—E.B.O.

125 Subba-Rao, N. S. and Suryanarayanan, S **Exosmosed substances on the leaf-blade of rice (*Oryza sativa* L.).** *Curr. Sci.* 1957, **26**, No. 6, 186–7, bibl. 4. [Univ. Bot. Lab., Madras, India]

A preliminary report is given on the nature of the exosmosed substances on the leaf-blades of the varieties of rice resistant and susceptible (Co 4 and Adt 10, respectively,) to *Piricularia oryzae*.—M.P.

126 Padmanabhan, S. Y. and others. **Control of the blast disease of rice with spray fungicides.** *Indian Phytopath.* 1956, **9**, No. 1, 15–22, bibl. 6.

In trials to control blast (*Piricularia oryzae*) of rice, 4 sprayings of Bordeaux mixture 5-5-50 or 2·5–3·5–50 ; coppesan 0·5%; perenox 0·3% ; or dithane 0·2% reduced neck infection and increased yields considerably. An increase in yield up to 74% over the control was recorded in a very susceptible variety. Differences among the fungicides tested were not always significant. The cost of treatment was economical.—E.B.O.

127 Atkins, J. G. and others. **Preliminary studies on root parasitic nematodes of rice in Texas and Louisiana.** *F.A.O. Pl. Prot. Bull.* 1957, **5**, No. 4, 53–6, bibl. 4. [U.S. Dep. Agric., and Lousiana Agric. Exp. Sta., Baton Rouge]

Parasitic or suspected parasitic nematodes found in rice fields in Texas and Louisiana are listed. The efficiency of soil fumigation was investigated in 3 experiments in rice fields where the predominant parasitic nematodes were *Tylenchorhynchus martini*, *Psilenchus* sp. and *Radopholus oryzae*. Of the 4 commercial nematocides tested, MC-2 (methyl-bromide) applied at the rate of 3 lb./100 sq. ft. gave excellent nematode control and 45% higher rice yields than the control.

Dowfume W-85 (ethylene dibromide) at 12 gal./ac. increased yield by 34% over the control, but the populations of *Radopholus oryzae* were nearly as high in the Dowfume W-85-treated plots, at maturity of the rice, as in the untreated plots.—J.K.L.

128 KOBER, E. A. M. Como combater o percevejo do arroz. [**How to control *Solubea poecila* on rice.**] *Lavour. arroz.* 1957, **11,** No. 124, 24–5.

To control *Solubea poecila*, a noxious insect pest of rice in Rio Grande do Sul, Brazil, the following 2 preparations are recommended: rhodiagama "2" (benzene hexachloride) and rhodiatox 1% type BCl (1% parathion). These insecticidal dusts should be applied at the rate of 10–15 kg./ha.—E.B.O.

129 BOWLING, C. C. **Spray application to control the rice water weevil.** *Rice J.* 1957, **60,** No. 6, 21. [Rice Pasture Exp. Sta., Beaumont, Tex.]

In 2 tests to control the rice water weevil (root maggot), *Lissorhoptrus simplex*, dieldrin applied as a spray at 0·25 lb./ac. gave 94 and 98% control, respectively. The yield was not increased.—J.F.C.

130 JORDAN, H. D. **Crabs as pests of rice on tidal swamps.** *Emp. J. exp. Agric.* 1957, **25,** No. 99, 197–206, bibl. 9. [W. Afr. Rice Res. Sta., Rokupr, Sierra Leone]

For the control of crabs, mainly *Sesarma huzardi*, technical BHC was effective when applied as a 10% suspension after high spring tides in the dry season; lindane was quicker-acting at equivalent concentrations. The compounds were repellent in baits but effective as contact poisons. Technical BHC, at 0·5 oz./sq. yd., applied to rice seedlings in the nursery, gave considerable protection to the seedlings after transplanting under normal conditions.—From author's summary.

131 FRITH, H. J. **Wild ducks and the rice industry in New South Wales.** *Wildl. Res.* 1957, **2,** No. 1, 33–50, bibl. 4, illus.

A study of the ecology and economics of wild ducks in the irrigated rice-growing areas of New South Wales showed that the amount of damage they caused was correlated with climatic conditions, and that on the whole, they are a very minor pest.—From author's summary.

132 RABECHAULT, H. Anatomie comparée des organes végétatifs de deux riz de l'Ouest Africain. [**Comparative anatomy of the vegetative organs of two West African rices.**] *Agron. trop., Nogent* 1957, **12,** No. 3, 313–28, bibl. 57, illus., English, French and Spanish summaries.

This is a study of the roots, stems and leaves of *Oryza barthii*, a perennial rice with rhizomes, which grows on flooded land, and of *O. glaberrima*, an annual hill rice, including several varieties, which grows on dry land. These 2 species are related systematically but present particular anatomical characters, mainly in the roots, some of which have been acquired for adaptation to the environment.—E.B.O.

133 OGURA, T. **Studies of upland rice plants. 4. On morphological characteristics of seminal root.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **25,** No. 3, 154–6, illus., English summary. [Tokyo Univ. Agric. and Technol.]

Upland rice is distinguished from lowland rice by the diameter of the central cylinder, number of protoxylem groups, diameter and number of metaxylem groups, development of sclerotic cells in the hypodermis, endodermis and central cylinder, and the intercellular spaces in the cortex.—From English summary.

134 TAKAHASHI, N. and others. **Studies on the mechanism of tiller development in rice plants.** [Japanese] *Bull. Inst. agric. Res., Tôhoku* 1956, **8,** No. 2, 91–117, bibl. 12, illus., English summary.

N- and carbohydrate-translocation to and from the leaf sheath, leaf blade and stem was followed during the growth of rice plants grown under normal, K-deficient and P-deficient conditions. Tillering was directly related to the translocation of N from the leaf-blade and -sheath to the stem. Where the N-concentration of the stem was low at tillering as in P-deficient plants, few tillers were formed. In K-deficient plants the N-content of the stem was high at tillering and continued to increase until flowering; the number of tillers produced was high. In the control plants, the N-level of the stem was intermediate at tillering, and remained stationary until flowering and then decreased, this was reflected by the number of tillers formed being greater than in the P-deficient but less than in the K-deficient plants. In all cases the soluble-carbohydrate content of the stem rose during tiller-development, and its function was primarily one of tiller-nutrition.—From English summary.

135 MATSUSHIMA, S. and TSUNDODA, K. **Crop-scientific studies on the yield-formation and the yield-forecast of lowland rice. 36. On forecast of the number of spikelets per panicle.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **25,** No. 3, 141–2, illus., English summary. [Nat. Inst. Agric. Sci.]

The forecast is based on the high correlation between the number of spikelets on a panicle and the thickness of the first elongated internode at the base of the culm. This is thickest at the stage of differentiation of spikelet primordium.—From English summary.

136 ALIM, A. and SEN, J. L. **Inter-relation-**

ship of some plant characters with the yield of spring paddy (Boro). *Pak. J. sci. Res.* 1957, **9**, No. 2, 54–7, bibl. 4. [Deep Water Paddy Res. Sta., Habiganj (Sylhet)]

The number of tillers per plant, the length of the panicle and the number of grains per panicle were collectively associated with yield. The positive correlation with yield was strongest with number of tillers per plant, and least with number of grains per panicle. The correlations between these 3 characters were also calculated.—D.B.

137 NILES, J. J. **Analysis of the sequence of flowering in rice.** *Trop. Agriculturist* 1956, **112**, No. 4, 305–12, bibl. 6, illus. [Cent. Res. Sta., Dep. Agric., Ceylon]

Developmental studies were carried out with plants of the rice variety Pannity, spaced at 7 in. × 7 in., after transplanting. A negative correlation existed between panicle order and the length and weight of the panicle, number of grains per panicle and 100-grain weight. Panicle contribution to the yield of a plant declined with lateness of development. The main culm and 1st-order tillers contributed 65–85% of the grain yield of a plant.—M.P.

138 MURATA, Y. and others. **Photosynthesis of rice plants. 4. Plant factors constituting photosynthetic ability of the rice plants growing on paddy field.** *Proc. Crop Sci. Soc. Japan* 1957, **25**, No. 3, 133–7, bibl. 2, illus., Japanese summary. [Nat. Inst. Agric. Sci.]

139 YAMADA, N. and OTA, Y. **Physiological character of rice seedlings.** *Proc. Crop Sci. Soc. Japan* 1957, **25**, No. 3, 165–8, illus., Japanese summary. [Nat. Inst. Agric. Sic.]

Lowland and upland rice seedlings are defined. They are compared as regards protein- and carbohydrate-content, rooting activity, respiration rate and resistance to flooding. The physiological significance of "hardness of seedlings", which is expressed as dry weight of tops/plant height, is briefly discussed.—D.B.

140 FUJII, Y. and TANAKA, N. **Intensity of guttation in rice seedlings in relation to earliness or lateness of the variety.** [Japanese] *Proc. Crop Sci. Soc. Japan* 1957, **25**, No. 3, 131–2, English summary. [Fac. Agric., Saga Univ.]

Guttation increased with the lateness of varieties.—From English summary.—D.B.

141 RAJAGOPALAN, K. **Studies on drought resistance in rice.** *Madras agric. J.* 1957, **44**, No. 5, 194–205 ; No. 6, 226–37, bibl. 44, illus. [Agric. Coll., Res. Inst., Coimbatore, India]

Five drought-susceptible cultivated rices were crossed with 9 wild varieties belonging to *O. sativa* forma *spontanea* which were drought-resistant, and the hybrid progenies studied for possible features correlated with drought resistance. Light green plants resisted drought better than dark green plants. Progenies which resembled the wild type more than the cultivated type were more drought resistant, and resistant plants had a highly developed root system.—M.P.

142 UMALI, D. L. and others. **The effect of time of lodging upon the yield and other agronomic characteristics of rice.** *Philipp. Agriculturist* 1956, **40**, No. 4, 178–84, bibl. 6. [Cent. Exp. Sta., Philippines]

The greatest reduction in grain yield of the rice varieties Mangasa, Thailand and Milfor 6(2) (susceptible, of medium susceptibility, and resistant to lodging, respectively) occurred when the plants were lodged 2 weeks before heading and the least reduction when they were lodged 2 weeks after heading. The decrease in yield due to lodging was less in Milfor 6(2) than in the other varieties. Earlier maturity was noted when the plants lodged later. The colour and texture of the grain were adversely affected by early lodging.—E.B.O.

143 SHARP, M. A. **An instrument for testing resistance to lodging.** *Indian Fmg* 1957, **7**, No. 1, 6, illus.

An instrument for the field measurement of the stiffness of rice straw in relation to lodging is described. A length of string, passing by means of 2 pulleys over a tall post inserted in the ground, connects the rice stalk being tested to a glass cylinder calibrated in cc. Water is added to the cylinder until the rice stalk bends or breaks. From the length of the stalk below the string and the lateral movement of the stalk, the critical angle is determined ; the load required to bring about bending or breakage can be directly measured.—M.P.

144 SAMPATH, S. and SESHU, D. V. **Variability in protein content of rice.** *Curr. Sci.* 1957, **26**, No. 5, 139, bibl. 3. [Central Rice Res. Inst., Cuttack, India]

Analyses were made to ascertain the genetic variability in the percentage of protein in different kinds of rice. Rice types with long sterile lemma (a distinctive genetic character) had a higher protein content than the commoner types with short sterile lemma. The wild species *Oryza australiensis* had a higher protein content than *O. sativa*, and tetraploid plants of *O. sativa* had a higher protein content than the diploid plants, but they were unsuited for cultivation, being poor yielders.—D.B.

145 OKAJIMA, H. and TAKAGI, S. **Physiological behaviour of hydrogen sulfide in the rice plant. 8. Phosphorus fractions**

and its release by the root treated with H_2S. [Japanese] *Bull. Inst. agric. Res., Tôhoku* 1957, **8**, No. 3, 185–20, bibl. 17, illus., English summary.

146 LOCKARD, R. G. **The foliar symptoms of deficiencies of the major elements in rice.** *Malay. agric. J.* 1956, **39**, No. 4, 268–76, bibl. 8, illus.

Results are given from two sand-culture trials, in one of which the rice variety Siam 29 was used and in the other the varieties Pebifun, Radin Siak 34 and Serendah Kuning. Deficiency symptoms of N, P, K, Ca and Mg are described for Siam 29. Observations on the other three varieties were made where the symptoms varied from those on Siam 29. The symptoms described for N, P, K and Mg are probably fairly typical for all the varieties tested. No consistent symptoms for Ca were obtained. Deficiencies of P and Mg showed up more easily in the growth of the plant, and in the uptake of nutrients, than did the deficiencies of K and Ca. Plates showing the symptoms of N, P, K and Mg deficiencies are presented. The results of leaf analyses are discussed.—E.B.O.

147 LOCKARD, R. G. and MCWALTER, A. R. **Effects of toxic levels of sodium, arsenic, iron and aluminium on the rice plant.** *Malay. agric. J.* 1956, **39**, No. 4, 256–67, bibl. 30, illus.

In two sand-culture trials with rice, the toxic effects of Na and As were tested on the variety Siam 29, and those of Fe and Al on the varieties Pebifun, Serendah Kuning and Radin Siak 34. The effect of Na on Na-resistant varieties was also examined. A great difference in varietal tolerance to Na was found. The non-resistant variety Siam 29 suffered severely when the Na was much above 800 ppm. in the solution. It is suggested that if a soil contains more than 0·5% NaCl, salt-tolerant varieties should be planted. The results of analyses indicated that if plants of non-resistant varieties contain more than about 6% Na in the ash, they are likely to have been suffering from Na toxicity. A concentration of 5 ppm. As damaged the plants. It is suggested that rice may suffer from As-toxicity when the As-content of the plant is 3-6 ppm. Pebifun was the most susceptible to Fe toxicity but the other two varieties suffered considerable damage even with 50 ppm. chelated iron. With the concentrations of Al used (0·8–4 ppm.), rice suffered little from the effects of that element.—E.B.O.

148 PORTÈRES, R. Taxonomie agrobotanique des riz cultivés, *O. sativa* Linné and *O. glaberrima* Steudel. [**Agrobotanical taxonomy of cultivated rice, *O. sativa* and *O. glaberrima***.] *J. Agric. trop. et Bot. appl.* 1956, **3**, No. 7–8, 341–84, No. 9–10, 541–80, No. 11, 627–700 and No. 12, 821–56, illus.

The historical evolution of the taxonomy of rice is examined. Critical notes are given on the terms used for varieties and forms of rice, and suggestions are advanced for modifying the present agrobotanical nomenclature. The main conclusion drawn from a study of the rice types present in West Africa is that the colour of the paleae is the fundamental character which has led to varietal differentiation and to the evolution of cultivated varieties. An attempt is made at classifying all the botanical forms of rice on this basis.—E.B.O.

149 COYAUD, Y. and others. Réponse du riz à la fumure en riziculture aquatique à l'Office du Niger (Soudan français). [**Response of swamp rice to manuring at the Office du Niger (French Sudan)**.] *Riz et Rizicult.* 1957, **3**, No. 2–3, 65–73, bibl. 9, English and Spanish summaries.

Information is given on climate and soils. The varieties grown are Sikasso B and Bentoubala B. In manurial trials, N applied alone increased yields by 27% over the control, being better than NP, NK and NPK which increased yields by 13–20%.—From authors' summary.

150 ANGLADETTE, A. La réponse du riz à la fumure dans les territoires français d'Afrique tropicale. [**The response of rice to manuring in French tropical Africa.**] *Riz et Rizicult.* 1957, **3**, No. 2–3, 57–9, illus., English and Spanish summaries.

In French West Africa both swamp rice and upland rice are grown. At the Office du Niger, French Sudan, and at Richard-Toll, Senegal, where a good control of irrigation water has been attained, N only gives significant increases in yield, the increases being 9 kg. of grain per 1 kg. of N (applied at the rate of 30–40 kg./ha.) at Richard-Toll, and 23–41 kg. per 1 kg. of N (applied at 30–100 kg./ha.) at the Office du Niger. With upland rice using mechanized cultivation, N applied at the rate of 20 kg./ha. increases yields by 30–40%.—E.B.O.

151 ROCHE, P. and others. Réponse du riz à la fumure à Madagascar. [**Response of rice to manuring in Madagascar.**] *Riz et Rizicult.* 1957, **3**, No. 2–3, 75–101, bibl. 9, English and Spanish summaries.

Information on climate and cultural methods, and an account of manurial trials, are given for different regions of Madagascar.—E.B.O.

152 EVATT, N. S. and WEIHING, R. M. **Fertilizer requirements for rice in rice-pasture rotations.** *Rice J.* 1957, **60**, No. 6, 38–40, illus. [Rice-Pasture Exp. Sta., Beaumont, Texas]

The following rotations were practised on Beaumont clay during 1947–56 : rice and un-

improved (volunteer) pasture in alternate years ; 3-yr. improved pasture, 1-yr. rice, 1-yr. unimproved pasture and 1-yr. rice ; 4-yr. improved pasture, 2-yr. rice; 5-yr. improved pasture, 3-yr. rice. The pastures were grazed with beef cattle. Improved pastures received annual autumn applications of 30 lb. P_2O_5 per ac. as superphosphate. Rice following improved pasture yielded 4–5 barrels [1 barrel=162 lb.] per ac. more than rice following unimproved pasture for equal increments of N. Rice yields in all systems were increased by applications of 80 lb. N/ac., but at this rate after improved pasture, lodging was likely. After 3 years of improved pasture, there was sufficient residual P for 1 rice crop and after 4–5 years, for 2 crops.—J.F.C.

153 Beacher, R. L. **Rice fertilizer tests.** *Rice J.* 1957, **60,** No. 7, 50–2. [Rice Br. Exp. Sta., Stuttgart, Ark.]

In tests conducted at the Stuttgart Station and on 5 outlying farms in the rice area, it was found that different irrigation practices did not influence yields in the absence of N-topdressing. Yields were increased by 25 bu./ac. (42%) and 43 bu. (73%) by topdressing with 100 and 200 lb. of urea/ac., respectively, under normal irrigation practices ; 300 lb. caused no further yield increase. Fertilizer applied on the top of water to undrained plots gave smaller yield-increases than that applied to dry soil on drained plots ; 300 lb. of urea on undrained plots gave a yield increase similar to that obtained from 100 lb. on drained plots. On alkaline soils, unfertilized plots of Bluebonnet 50 yielded 38·2 bu./ac., but 58·4 bu./ac. after treatment with 100 lb. of urea alone. Broadcasting feralum on the alkaline soil before sowing was beneficial to rice growth and yield, but rates of 1000 lb. or more per ac. appeared necessary to produce marked yield increases above that obtained from N alone.—J.F.C.

154 Mikkelsen, D. S. and Finfrock, D. C. **Availability of ammoniacal nitrogen to lowland rice as influenced by fertilizer placement.** *Agron. J.* 1957, **49,** No. 6, 296–300, bibl. 8, illus. [Agric. Coll., Univ. Calif., Davis]

155 Mikkelsen, D. S. and Finfrock, D. C. **Fertilizer placement for rice.** *Calif. Agric.* 1957, **11,** No. 7, 7, 15.

Surface and subsurface placement, and both types of placement combined, of ammonium fertilizers before and after flooding were studied for 4 years. The highest rice yields and the maximum N-utilization were obtained where $(NH_4)SO_4$ was drilled into the seedbed to a depth of 2–4 in. before flooding. Subsurface placement gave yields 25–50% higher than did broadcasting.—J.F.C.

156 Allen, E. F. and Coulter, J. K. **Wet padi manurial experiments on peat soils in Malaya.** *Malay. agric. J.* 1957, **40,** No. 1, 30–8, bibl. 1.

Early attempts to grow rice on peat soils in Malaya were unsuccessful. At Padang Kemunting, Trengganu, where the water supply depends on rainfall and the station is well drained, the peat is over 9 ft. deep with a pH of 4·1. Trials here showed that the application of double superphosphate (40% P_2O_5) and surface-peat burning increased rice yields (grain and straw) and stimulated tillering. Yields of up to 1800 lb. of grain per ac. were obtained in 1955 from these treatments. At Chenderong Balai, Perak, where the peat is shallower and less acid and the land is irrigated, yields were usually poor, but a response to phosphate was also noted.—E.B.O.

157† Simmons, K. V. **Establishment of legumes sown with rice.** *Agric. Gaz. N.S.W.* 1957, **68,** Pt 4, 198–9, 217, illus. [Yanco Exp. Fm, N.S.W.]

Results from trials have shown that hard seed of West Australian blue lupin (*Lupinus varius*), strawberry clover (*Trifolium fragiferum*) and Bokhara clover (*Melilotus alba*) sown with rice will withstand submergence during the growth of the crop and germinate after rice harvest in spring, but the last two legumes will do so only after the straw is removed.—M.P.

158 Pingale, S. V. and others. **Effect of insect infestation on stored grain. 2. Studies on husked, hand-pounded and milled raw rice, and parboiled milled rice.** *J. Sci. Fd Agric.* 1957, **8,** No. 9, 512–16, bibl. 8. [Cent. Fd Technol. Res. Inst., Mysore, India]

Rice, var. Halubbulu, was infested with *Calandra oryzae* for 8 months and changes brought about by infestation were studied. Husked rice was infested to a greater degree than the other samples ; parboiled and raw, milled samples were least susceptible. [See also *Fld Crop Abstr.* 8 : 37.] —From authors' summary.

159 Boyce, D. S. **Aspects of in-bin drying of padi in Malaya utilizing the waste heat of an internal combustion engine.** *Malay. agric. J.* 1956, **39,** No. 4, 277–92, bibl. 11, illus.

GENERAL

160 Valdeyron, G. Quelques conclusions d'ensemble sur les dernières campagnes d'expérimentation céréalicole. [**Some general conclusions from cereal trials in recent years (in Tunisia).**] *Tunisie agric.* 1957, Jan.-Feb., pp. 20, illus. [Serv. Bot. Agron., Tunisia]

161 Harper, H. J. and Gray, F. **Effect of seven annual legumes on the yield of corn and oats on Norge loam.** *Agron. J.* 1957,

49, No. 6, 293–6. [Oklahoma Agric. Exp. Sta., Perkins Farm]

Hairy vetch [*Vicia villosa*], New Era cowpeas [*Vigna* sp.], Laredo soyabeans, Golden mung-beans [*Phaseolus aureus*], Madrid sweet clover [*Melilotus* sp.], Spanish groundnuts and Tepary beans [*Ph. acutifolius* var. *latifolius*] were grown in 3-year rotations with maize and oats from 1931–55. Results showed that the average oat yield was increased by 10·6 bu./ac. and the average maize-yield by 1·8 bu./ac., compared with the yields obtained when weeds were allowed to grow every 3rd year in the rotation. When the legumes were cut for hay, the average oat yield was increased by 6·1 bu. and the average maize yield decreased by 0·4 bu./ac. When applied to plots from which legumes were harvested for hay, 60 lb. N/ac. increased oat and maize production by 8·2 and 3·3 bu./ac., respectively. Maize in a 3-year rotation with weeds gave the same average yield as continuous maize fertilized annually with 16 or 33 lb. N/ac.—From authors' summary.

162 Doll, E. C. and Link, L. A. **Influence of various legumes on the yields of succeeding corn and wheat and nitrogen content of the soil.** *Agron. J.* 1957, **49**, No. 6, 307–9, bibl. 8. [Kentucky Agric. Exp. Sta., Lexington]

Various legumes were grown in a 3-year rotation of legume, maize and wheat from 1927–54 on Crider silt loam in western Kentucky. The cereal yields in all cases tended to increase with time; they were much lower after soyabeans than after the other legumes. The residual effect of Lespedeza compared favourably with that of red clover and sweet clover [*Melilotus* sp.].—From authors' summary.

163 Ebert, D. Untersuchungen über die Verträglichkeit der Getreidearten untereinander. [**Investigations into the mutual compatibility of different cereals.**] *Z. landw. Versuchs- u. Untersuchwes.* 1956, **2**, No. 3, 221–40, bibl. 11, illus. [Landw. Versuchs.- u. Untersuchwes., Leipzig]

The effects of the preceding cereal crop on water-consumption, transpiration, nutrient content and grain yield of the succeeding cereal crops were studied, using all combinations of oats, spring-barley, winter-barley, -rye and -wheat as preceding and following crops. Results were compared with those obtained from the cultivation of the cereal on fresh soil and on soil containing extracts of a cereal. The different preceding crops had varied effects on the succeeding cereal, and the results, which are fully illustrated, are discussed for each experiment.—M.P.

164 Edwards, R. S. **Studies of the growth of cereals on seed-beds prepared by dry-sieving of the soil.** *Emp. J. exp. Agric.* 1957, **25**, No. 99, 167–84, bibl. 15, illus. [Dep. Agric., Univ. Coll. Wales, Aberystwyth]

The studies were designed to discover to what extent variations in the size-distribution of aggregates and solid particles in the seed-bed affected the emergence, development and grain- and straw-yields of Spratt Archer spring barley and S 172 winter oats. Germination and emergence were satisfactory on seed-beds ranging from fine to those consisting very largely of clods and stones; but the finest seed-bed usually had *c.* 10% greater emergence than the coarser, depending on the environmental factors. There was some evidence that winter oats were more responsive to changes in the firmness of the seed-bed than was spring barley.—M.P.

165 Wuth, E. Ergebnisse von Drillmethodenversuchen zu Getreide. [**Results of trials on methods of drilling cereals.**] *Dtsch. Landw.* 1957, **8**, No. 8, 390–2, bibl. 8. [Inst. Landw. Untersuchungswesen, Jena, E. Germany]

In a 3-yr. experiment using winter-rye, winter-wheat, spring-barley and oats, cross-drilling at 20 cm. and narrow-drilling at 10–12 cm. were compared with one another and with normal drilling at 20 cm. Different years produced somewhat different results. Taking the 3-year average, cross-drilling was not a satisfactory method because the yield increases obtained over normal sowing, where they occurred, were insufficient to justify the extra labour cost involved. Narrow-drilling produced approximately the same yield increases as cross-drilling but with little extra expenditure on labour.—D.B.

166 Budko, A. I. and Hotulev, M. I. [**An investigation of the swath-harvesting of cereal crops in the Kuban.**] [Russian] *Meh. Elektrif. soc. seljsk. Hoz.*, 1956, No. 1, 38.

The differences in grain losses with relatively weed-free crops of wheat and barley were 2·3–6·1% and 2·2–5·2%, respectively, for swath-harvesting, and 1·8–3·9% and 2·9–6·2%, respectively, for direct combine-harvesting. However, the marked presence of weeds increased losses from the latter method by 1·5–2 times. With stubble heights of 19–20 cm. and 25–30 cm., grain losses were 0·1% and 0·6% respectively for both methods, the seed having a germination of 97–99·5%.—From *Agric. Hort. Engng Abstr.* 1957, 8, Abs. 808.

167 Müller, K. H. Getreidesortenversuche und ihr Ergebnis. [**Results of cereal varietal trials.**] *Dtsch. Landw.* 1957, **8**, No. 9, 432–7, illus. [Inst. landw. Versuchs- u. Untersuchwes, Jena, E. Germany]

Results are given of 6–yr. trials, with several cereal varieties, in each of the cultivation zones of E. Germany. There are observations on vegetative characters, quality and yield. Taking the

average results for E. Germany as a whole, the following stand out as high grain-yielding varieties : winter wheat, Bastard II and Hadmerslebener VIII and IV ; spring wheat, Peko ; winter barley, Rekord and Jutta ; spring barley, Elsa ; winter rye, Petkuser ; Oat, Flämingsgold, Flämingstreue, Goldhafer II and Universal.—D.B.

168 British Weed Control Conference. **Proceedings of the 3rd Meeting, 1956.** 1957, Vol. 1, pp. 431 ; Vol. 2, pp. 433–870. [For other papers see Abs. 194, 219, 276, 362.]

Papers presented included :

1. Weedkiller usage in England and Wales ; information from surveys of farm practice. By D. A. Boyd, pp. 17–26, bibl. 1. The farm use of a number of herbicides on cereals and peas is discussed.

2. A contribution to the question of the effect of leaf scorch by contact herbicides on the yield of cereals. By P. Gregory, pp. 341–50, bibl. 1. Activated DNC, dinoseb and PCP (oil emulsion) were compared for winter- and spring-application to winter- and spring-sown cereals, respectively. The intensity of scorch for each chemical was greatest with barley, less with oats and wheat, least with rye. Crop injury was correlated with frost after spraying. Yield was not correlated with scorch but with kill only. PCP and dinoseb gave more scorch than DNC, but 0·75 lb. dinoseb/ac. was as good, in terms of weed control and crop yield, as 4·5 lb. DNC/ac. Mixtures of 0·5 lb. dinoseb (amine) + 0·3 lb. MCPA/ac. gave excellent results in both winter- and spring-crops. —From *Weed Abstr.* 6 : 472.

3. Early spraying of spring cereals with MCPA (potassium) and MCPB (sodium). By T. C. Breese, pp. 383–90, bibl 4. MCPB (12 gal./ac.) proved inferior to MCPA for the control of annual weeds, but caused no deformities in spring cereals, except spring oats, sprayed at the pre-tillering stage. Early spraying (before 5 leaves had developed on the main stem) increased yields more than spraying at the normal time.

4. Comparison of early application of MCPB and low rates of MCPA on cereals. By F. R. Stovell, pp. 391–7, bibl. 5.

5. The effect of MCPB and 2,4-DB on cereal crops. 1. Winter and spring wheat. 2. Spring barley and spring oats. By J. G. Elliott, pp. 399–415, bibl. 2.

6. The relative toxicity of MCPB, 2,4-DB and MCPA to [spring] cereals. By K. Carpenter and C. Wilson, pp. 417–22.

7. A contribution to the question of the effect of 2,4-DB and MCPB on the yield of cereals in different development stages. By C. Baker and R. K. Pfeiffer, pp. 423–7. Barley and spring wheat were studied.

8. A new development in selective weed control. 1. Introduction and weed control data. By G. B. Lush, pp. 625–32, bibl. 1. 2. Effect on cereal development. By E. L. Leafe, pp. 633–40. MCPP and α(2,4-dichloro-3-methylphenoxy) proprionic acid at 2 lb. a.e. in 20 or 40 gal. of water/ac. gave as good control of *Galium aparine* in cereals as DNC at 6–8 lb. in 50–100 gal. of water/ac. MCPP gives as good a control as MCPA of a range of annual and perennial weeds, whereas α(2,4-dichloro-3-methylphenoxy) propionic acid is specific to *G. aparine*. The weed should be sprayed between the 3-internode stage and flowering. All compounds tested were severely toxic to cereals, but at equi-effective rates the margin of safety with MCPP was greater than with MCPA.

9. Control of hormone-resistant weeds in cereals. By T. C. Breese and A. F. J. Wheeler, pp. 759–65. Sodium monochlorate at 20 lb. in 20 gal. of water/ac. effectively controlled *G. aparine*, *Polygonum persicaria*, *Sinapis arvensis* and *Galeopsis tetrahit*. It checked the growth of advanced seedlings of *Stellaria media* and *Convolvulus arvensis* ; and of *Cirsium arvense*, *Lithospermum arvense* and *Tussilago farfara* at all stages. Winter wheat at the 2- to 4-tiller stage was unaffected, but a depression in yield, *c.* 10%, occurred if spraying took place when the crop was more than *c.* 9 in. tall, possibly due to mechanical injury during spraying.

10. The role of MCPB and 2,4-DB for the control of weeds in undersown cereals, young leys, and established pasture. 1. 1955 results (2,4-DB not included). By W. Ochiltree, pp. 445–53. 2. 1956 results. By P. F. Le Brocq and C. R. Beech, pp. 455–63.—M.P.

169 Petzold, K. Untersuchungen über die Wirkung des Mähdruschverfahrens auf die Verunkrautung. [**Investigations on the effect of combine-harvesting on weediness.**] *Mitt. biol. BundesAnst. Berl.* 1957, **87**, March, 84–90, bibl. 2, illus. [Inst. Pflanzenschutz, Landw. Hochschule, Stuttgart-Hohenheim, W. Germany]

To reduce weed incidence in cereal fields, combining should be carried out within a week of the cereal reaching the ' binder-ripe ' stage, and both straw and chaff should be removed at once. Any delay in harvesting or straw and chaff removal may result in a marked increase in weediness.—M.P.

170 Zahariadi, C. Cercetări asupra combaterii buruienilor prin ierbicide şi influenţa acestora asupra producţiei de cereale. [**Chemical control of weeds and the effect of herbicides on grain yield.**] *Anal. Inst. Cerc. agron. Român.* 1955, **22**, 331–78, bibl. 60, illus., French and Russian summaries. [Studina Sta., Craiova Prov., Romania] [Received July, 1957]

A study was made of herbicidal action on the most common and harmful weeds in the Studina locality, namely *Lepidium draba*, *Convolvulus arvensis*,

Polygonum convolvulus, *Vicia striata* and *Veronica hederifolia* as well as *Sinapis arvensis*. For spraying, 700–1000 l. of herbicide solution/ha. were required. By choosing a suitable date, only 1 application was necessary. The best formulations were 0·1% 2,4-D + 1% emulsifiable oil, 0·1% 2,4-D + 0·25–0·5% penetrol, and 2% 'Agr' (based on potassium 2 - methyl - 4 - chlorophenoxyacetate). The required application rate of 2,4-D was 1–2 kg./ha., 2–8 times the rate required for *S. arvensis*. Contact herbicides caused strong leaf burn without harming the perennials, but they depressed *S. arvensis* and *V. hederifolia*. Applied in emulsifiable oil, sodium dinitro-o-cresolate and NaPCP seemed suitable for control of some annual weeds which were destroyed the day after treatment, whereas they were not destroyed until several weeks after the application of hormone-type herbicides. More or less serious leaf burn of cereals was caused but the increases in grain yield (39–40%) were higher with contact herbicides, than with hormone-type herbicides (5–26%) and hand weeding (20%). The hormone-type herbicides applied as 0·1% solution had no visible action on cereals, but occasionally 0·2% caused ear deformity. Maize (var. Romînesc de Studina) was more susceptible to hormone herbicides than barley, oats or wheat.—From author's summary.

171† Bjegovic, P. Žitni bauljar (*Zabrus tenebrioides* Goeze) i Njegova parazitsda muva (*Viviania cinerea* Fall.). (Bioloska i ekološka studija). [***Z. tenebrioides* and *V. cinerea*; a biological and ecological study.**] *Posebna Izdanja* (*Mem. Inst. Pl. Prot., Yugosl.*) 1957, No. 5, pp. 104, bibl. 88, illus., English summary.

Z. tenebrioides caused great damage to winter cereal crops in Yugoslavia during 1947–52, when it is estimated to have destroyed 18,251 acres of winter wheat, barley and rye. The larvae infest many gramineous plants including : *Poa annua*, *P. trivialis*, *P. fertilis*, *P. pratensis*, *Agropyron repens*, *A. cristatum*, *Lolium perenne*, *L. italicum*, *Dactylis glomerata*, *Bromus inermis*, *Phleum pratense*, *Alopecurus pratensis* and *Festuca rubra*. The larvae do not feed on *Avena elatior*, *A. sativa* or *Festuca arundinacea*. An account is given of : (1) the insect's biology ; (2) crop rotations to obviate infestation : (3) control by vernalizing winter crops or by growing only spring crops ; (4) the use of *Viviania cinerea* for biological control ; and (5) insecticides which have proved efficacious.—M.H.

172 Kudrna, K. Vodni režim rostlin a jeho závislost na vodnim a výživném režimu půdy. [**The water regime of plants in its relation to the water and nutrient regime of the soil.**] *Sborn. Vysoké Školy Zemed. Praze* (*Acta Univ. Agric., Praha*) 1956, 81–7, bibl. 11, Russian and German summaries.

In tests made with oats, barley and wheat, there is an indication that cell-sap concentration in the leaves is related to the time taken to vernalize the plants and to the different fertilizers applied. The concentration of cell sap is a factor which reacts with precision to changes in the water regime of the soil.—From summaries.—M.H.

173 Bullen, E. R. and Lessells, W. J. **The effect of nitrogen on cereal yields.** *J. agric. Sci.* 1957, **49**, Pt 3, 319–28, bibl. 13. [N.A.A.S., Cambridge, (E.R.B.) ; Rothamsted Exp. Sta., Harpenden, Herts, (W.J.L.).]

The results of 270 experiments carried out during the last decade in England and Wales have been examined. Wheat and barley produced a grain response of 3–3·5 cwt./ac. to a standard dressing of 0·25 cwt. N/ac., with the exception of the winter wheat varieties Hybrid 46, Cappelle Desprez, Bersée, Nord Desprez and Atle which averaged a response of more than 4 cwt./ac. The spring barley varieties Kenia, Proctor and Herta are also of greater-than-average responsiveness. Spring oats averaged a response of only 1·2 cwt./ac. The evidence suggests that in the drier eastern counties, autumn-N may give as good a response as the equivalent spring application. Small dressings of N provide equal responses whether applied early or late in spring ; larger applications need to be applied early in spring (March or April) to obtain the highest yields. There is no evidence that split applications are more efficient than a single, early-spring, dressing. The recommended applications are 0·6–0·7 cwt. N/ac. for highly responsive varieties of winter wheat and spring barley, and 0·5 cwt. N/ac. for other varieties of cereals.—From authors' summary.

174† Arthur, I. P. **Nursery harvesting and threshing machinery for pasture grasses and cereals.** *Int. Rep. 17 Cent. Exp. Workshops, CSIRO* Melbourne, 1955, pp. 12, bibl. 16, illus. [Received June, 1957]

This report describes machinery and methods for harvesting and threshing seeds from small experimental plots of pasture grasses and cereals. The particular requirements of CSIRO, and the work done by members of its staff in development of special machinery are outlined.—Author's summary.

175 Kent, N. L. **Mice in the stackyard. An estimate of rodent damage to stacked grain.** *Scot. Agric.* 1957, **37**, No. 1, 18–22, bibl. 4, illus. [Res. Assoc. Brit. Flour Mills, St. Albans, England]

The results are given of trials to determine the losses caused by rodent damage in grain stacks. The degree of rodent infestation of unprotected stacks varied, but grain losses appeared to range from 1 to 2% for every month the stacks remained unthreshed. Methods for protecting stacks against rodent infestation are described.—P.J.B.

176 Shepherd, D. R. **Khapra beetle eradication.** *F.A.O. Pl. Prot. Bull.* 1957, **5,** No. 5, 75–7, illus. [Agric. Res. Service, U.S. Dep. Agric.]

Eradication of the khapra beetle [*Trogoderma granarium*] in stored grain was carried out by enclosing the entire storage buildings in a gas-tight tarpaulin and fumigating with methyl bromide at the rate of 5 lb. per 100 cu. ft. To ensure a complete kill of the insect, the gas concentration must be held at 32 oz. per 1000 cu. ft. during any continuous 24 hr. of the 48 hr. during which the structures are sealed.—J.K.L.

177 Johnson, H. K. **Cooling stored grain by aeration.** *Agric. Engng, St. Joseph, Mich.* 1957, **38,** No. 4, 238–41, 244–5, bibl. 1, illus.

Cooling of grain by bin aeration was found to be effective in reducing grain temperatures thereby limiting both insect and microfloral activities. Problems connected with design and use of aeration systems for stored grain are discussed. Aeration appeared to be particularly advantageous where regular grain-turning operations are difficult or costly.—J.K.L.

LEGUMES

SOYABEANS

178 Hanway, D. G. **Irrigation produces high yields in Nebraska.** *Soybean Dig.* 1957, **17,** No. 7, 20–1, illus. [Neb. Agric. Exp. Sta.]

Fertilizer experiments in 1954 and '55 showed that inoculation of soyabeans is not reliable in supplying adequate N for good yields if the available N is low. Six irrigations without N increased yields by 7 bu./ac., but when combined with 60 lb. N, by 16 bu./ac. In 1954, 19-in. rows, although difficult to irrigate, yielded about 5 bu./ac. more than 38-in. rows ; in 1955, 28-in. rows yielded *c.* 4 bu./ac. more than 40-in. rows, with the same spacing in the row. The highest yields were obtained by keeping the top 4–6 ft. of soil wet at sowing and maintaining a high moisture level throughout the season. For the 2 years, non-irrigated plots averaged 22 bu./ac. and average yields from 1, 2 and 4 (or 6) irrigations were 30, 33 and 35·5 bu./ac., respectively.—J.F.C.

179 León, C. A. de. La soja. [**The soyabean.**] *Agricultura, Madr.* 1957, **26,** No. 299, 130–2, illus.

Information is given on soyabean-growing in Spain. Of several varieties which are grown successfully under irrigation, Capital and Harosoy yielded, in August 1956, more than 5500 kg. of seed per ha. It is considered that yields of soyabean grown as a second crop in Spain should average 2500–3500 kg. of seed per ha.—E.B.O.

180 Probst, A. H. and Everly, R. T. **Effect of soil insecticides on emergence, growth, yield and chemical composition of soybeans.** *Agron. J.* 1957, **49,** No. 7, 385–7. [Purdue Univ., Agric. Exp. Sta., Lafayette, Ind.]

Of 10 insecticides studied, only BHC and DDT at high rates had deleterious effects on soyabean emergence. High rates of BHC caused significant reductions in yield but not in seed quality. It was concluded that soyabeans can be sown safely following crops where soil insecticides have been used, as the doses used in the tests were much greater than are at present recommended for soil-insect control.—From authors' synopsis.

181 Howell, R. W. and others. **The effect of light quality on growth and composition of soybeans.** *Suppl. Pl. Physiol.* 1957, **32,** viii. [U.S. Reg. Soybean Lab., Urbana, Ill.]

Soyabeans were grown entirely under fluorescent lamps providing blue or pink light only. The plants grown in blue light, as compared with those grown in pink light, had shorter, stiffer and fewer internodes, flowered more quickly, and had a lower dry weight. Seedlings emerged more rapidly under blue light. The protein contents of the young and mature stems and of the mature seeds were higher, and the carbohydrate content of the stems and the oil content of the seed were lower under blue light.—From summary.

182 Raggio, M. and Raggio, Nora. Relación entre cotiledones y nodulación y factores que la afectan. [**The relationship between cotyledons and nodulation and factors affecting it.**] *Phyton* 1956, **7,** No. 2, 103–19, bibl. 30, illus., English abstract. [Dep. Bot., Univ. California, Berkeley]

In both soyabean (*Glycine soja*) and black wax bean (*Phaseolus vulgaris*), inoculated with Rhizobium, nodulation was obtained in light-grown and etiolated whole plants or plants bearing only the cotyledons when grown in a nitrate-free inorganic liquid medium, under aseptic conditions. With the strains used, nodulation occurred on the main and lateral roots in soyabeans, but almost entirely on the lateral roots in black wax bean. The presence of nitrate in the medium strongly deferred the nodulation of etiolated seedlings of both species ; in light, the nodulation of soyabean was delayed but the number of nodulated plants was not significantly inhibited, although the number of nodules per nodulated plant was reduced. In soyabean, there was also a shift of nodulation to the lateral roots when inoculation was made in 5-day-old seedlings, but not when inoculation was made in the seed. Light-grown black wax beans behaved in the same manner as the etiolated plants with respect to nitrate inhibition. The difference in the response to nitrate of light-grown plants bearing only the cotyledons

of the 2 species is explicable on the basis of the difference in permanence of the cotyledons in soyabean and black wax bean. The addition of 2% sucrose to the nitrate-free or nitrate-containing media caused intense inhibition of nodulation under all conditions tested. Great variation in the rate and amount of nodulation was found in both species.—From authors' summary.

GROUNDNUTS

183 Negi, L. S. and Dalal, J. L. **Spacing and manurial experiments on groundnut crop in the Punjab.** *Indian Oilseeds J.* 1957, **1**, No. 2, 85–90.

The experiments were conducted at the Samrala Experiment Station (Ludhiana District) and in cultivators' fields. The spacings used were 9 and 12 in. between rows and 9, 12, 18 and 24 in. between plants in rows. The normal spacing in present-day cultivation, 12 × 24 in., was used as the standard ; this produced the lowest yield of all spacings tried. Under rain-fed conditions in the Punjab the best spacing proved to be 12 in. × 9 in. (rows and plants, respectively,) which corresponded to an estimated sowing rate of 30 seer [60 lb.] per ac. On the Experiment Station fields, this gave a 52%, and on the cultivators' fields a 47%, increase above that obtained by standard spacing. The optimum fertilizer requirement was 25 lb. N per ac., applied as ammonium sulphate or ammonium phosphate.—D.B.

184 Seshadri, C. R. and others. **Curing trials on groundnut.** *Madras agric. J.* 1957, **44**, No. 6, 242–5. [Oilseeds Sect., Dep. Agric., Madras]

With a spreading and a bunch variety of groundnut, harvesting the crop when mature was superior to harvesting 10 days before maturity. Stripping the pods and then drying them in the sun for 1 week was better, with regard to yield and quality, than stacking the plants around a pole or leaving them to dry in the field for 10 days.—M.P.

185 Negi, L. S. and others. **Treatment of groundnut seed with " Ceresan " as a control measure against seed-borne diseases.** *Indian Oilseeds J.* 1957, **1**, No. 3, 158–62.

Tests were conducted at the Groundnut Experimental Station, Samrala, Punjab, and in cultivators' fields to assess the value of treating groundnut seed with 1% ceresan for control of collar rot (*Sclerotium rolfsii*). When treated, the medium-seeded Punjab No. 1 and the bold-seeded variety Aut gave average yield increases (pods) of 30 and 26% respectively, compared with untreated seed. The cost of treatment with 1% ceresan was low.—D.B.

186 Garren, K. H. and Duke, G. B. **The peanut stem rot problem and a preliminary report on interrelations of " non-dirting " weed control and other practices to stem rot and yield of peanuts.** *Pl. Dis. Reptr* 1957, 424–31, bibl. 19, illus. [Virginia Agric. Exp. Sta.]

In experiments carried out during 1955–6 on the control of stem rot of groundnuts caused by *Sclerotium rolfsii*, infection was less and yield greater for the Virginia bunch variety 46–2 with " non-dirting " weed control (no soil being thrown on the plants) than with " dirting " weed control (soil being thrown on the plants to smother weeds). In 1956, deep covering of surface litter and sclerotia gave better yields than shallow covering. PCNB applied as a drench at 12 lb. active substance/ac., 10 weeks after sowing the Dixie Spanish variety, was beneficial in reducing above-ground infection and pod damage.—From authors' abstract.

187 Nagarajan, K. R. and others. **The red hairy caterpillar (*Amsacta albistriga*) and its field-scale control.** *Madras agric. J.* 1957, **44**, No. 4, 150–3, bibl. 3.

Dusting a field of groundnuts with 15 lb. of 10% BHC/ac. within a week of moth emergence gave satisfactory and economical control of *A. albistriga*.—M.P.

188 Bhavanishankar Rao, M. and Nagarajan, S. S. **A case of epigaeous fructification in *Arachis hypogaea* Linn.** *Curr. Sci.* 1957, **26**, No. 6, 184–5, bibl. 4, illus. [Agric. Res. Inst., Coimbatore, India]

Epigaeous, or above-ground, fructification in the groundnut variety TMV 2 was observed during nutritional studies, and was most pronounced in treatments receiving comparatively high amounts of K.—M.P.

189 Higgins, B. B. Rapports de la sélection et des variétés avec la qualité des arachides en vue d'usages déterminés. [**Relationship of selection and varieties to quality of groundnuts with a view to particular uses.**] *Oléagineux* 1957, **12**, No. 7, 411–15, bibl. 33. [Georgia Agric. Exp. Sta.]

This review deals mainly with the classification of groundnut varieties and with the relationship between the varietal factor and seed quality. Of particular importance is the primary division of groundnuts into the group with alternate branching and the group with sequential branching. The seeds of these 2 groups show differences in dormancy and chemical composition. [See also *Fld Crop Abstr.* 9 : 820.]—E.B.O.

190 Raman, V. S. **Studies in the genus *Arachis*. 1. Observations on the morphological characters of certain species of *Arachis*.** *Indian Oilseeds J.* 1957, **1**, No. 4,

235–46, bibl. 5, illus. [Agric. Res. Inst., Coimbatore]

The morphological characters of 8 species of *Arachis* from Brazil, grown from seed, and of 4 species from Tanganyika, propagated from rooted stem-cuttings, are recorded in 7 pages of tables. In the text, a summary is given of the distribution of the following characters among varieties : growth and vigour, habit and branching, leaf-, flower-, pod- and kernel-characters, yield.—D.B.

PEAS

191 Hejndorf, F. and Dahl, M. H. Forsøg med afsvampning af ærtefrø. **[Experiments with chemical treatment of pea-seed.]** *Beretn. 534 Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1957, **60**, No. 4, 713–20, English summary. [Stat. Pl. Path. Inst., Denmark]

Results of 1954–5 trials with pea-seed using non-poisonous dressings showed that 4 g. 50% captan per kg. seed was the most effective treatment. In box-experiments this treatment gave a 8–41% increase in germination over untreated, the average germination (11 samples) was 85% for treated and 65% for untreated. In field experiments under wet and cold conditions similar increases were found ; experiments Nos. 5, 6, 7 and 8 gave 66, 54, 45 and 26% germination, respectively, for treated and 49, 39, 10 and 3%, respectively, for untreated seed.—J.K.L.

192 Petersen, H. I. and Raun, Karen. Sprøjteskade paa hør [og ærter]. **Flax (and peas) harmed by spraying.** *Ann. Rep. State Weed Res. Inst.*, 1955 [Contained in] *Tidsskr. Planteavl.* 1956, **60**, No. 3, 546, English summary. [Lystoftegaard, Skovlunde, Denmark]

Reports of spray-damage led to investigations and subsequent trials conducted by the Weed Research Institute. It was found that the damage was due to the mixing of the insecticides parathion and malathion with the herbicide used for weed-control. Observations also showed that peas were heavily injured if these insecticides were used mixed with the herbicide.—J.K.L.

193 Turner, H. Donella and Turner, J. F. **Physiology of pea fruits. 3. Changes in starch and starch phosphorylase in the developing seed.** *Aust. J. biol. Sci.* 1957, **10**, No. 3, 302–9, bibl. 26. [Bot. Schook, Univ. Sydney, N.S.W.]

[See also *Fld Crop Abstr.* 9 : 124 and 834.] The paper describes a study of the control of starch synthesis during the growth of seeds of *Pisum sativum* var. Canner's Perfection. The results and their bearing on sugar/starch relationships and on the general problems of growth is discussed.—From authors' summary.

194 British Weed Control Conference. **Proceedings of the 3rd Meeting, 1956.** 1957, Vol. 1, pp. 431 ; Vol. 2, pp. 433–870. [For other papers see Abs. 168, 219, 276, 362.]

Papers presented included :

1. Experiments with TCA for the control of wild oats in peas (progress report 1955). By Helen Holmes and others, pp. 65–8, bibl. 3. TCA was applied to pea seedbeds at 5 or 7·5 lb./ac., 34, 20 and 11 days before sowing. The heavier rate applied 1–3 weeks before sowing gave the best control (*c.* 70%) of *Avena* spp., but reduced the pea yield by about 10%.
2. Further experiments on the control of wild oats in peas : progress report 1956. By J. M. Proctor and W. A. Armsby, pp. 69–78, bibl. 2. Results of field trials indicate that TCA, at 7·5 lb./ac., should be applied to roughly-broken-down plough-land in late Feb. or the first 3 weeks of March, followed by 3–4 thorough cultivations in the next 2–3 weeks. The peas should then be sown in moderately wide rows and subsequently tractor-hoed. Some damage to peas by TCA appears to be inevitable, but up to 90% control of *Avena* spp. can be obtained.
3. Factors affecting the susceptibility of peas to selective dinitroherbicides. By O. Rosemary Dewey and others, pp. 313–27, bibl. 7. The effect of wind, wind and rain and wind-blown soil on pea plants and the susceptibility of the plants to dinoseb sprays was found to be due to injury to the cuticle and epidermis and a resultant increase in herbicide retention and penetration.
4. Weed control in peas with dinoseb and phenoxybutyric acid derivatives. By R. H. Hirst and others, pp. 523–9. Dinoseb at 1–3 lb. in 40 gal. of water/ac. generally gave a better control of weeds than MCPB or 2,4-DB at 20–36 oz. a.e./ac. Yields of the varieties compared were not affected, with the exception of Gregory's Surprise in one series and Thomas Laxton in another series of trials. A delay in maturity was observed in MCPB-sprayed plots.
5. The effect of MCPB on the yield and maturity of vining and picking peas. By K. Carpenter and others, pp. 515–21, bibl. 3. MCPB at 1·5-6 lb./ac. did not appear to affect the maturity of the 12 pea varieties on trial, or the yield of 8 of the varieties. Meteor and Shasta showed borderline tolerance, while Kelvedon Wonder and Gregory's Surprise were susceptible.—M.P.

BEANS

195 National Institute of Agricultural Botany. **Field bean and pea trials.** *37th Rep. nat. Inst. agric. Bot., Camb. 1956* [n.d.], 17–18. [Received Aug., 1957]

The total yield from mixtures of winter beans and S172 winter oats was very slightly higher than that from a pure crop of beans, but the crude

protein production was lower. The protein content of the oat grains in the mixture was higher than in pure oats. With winter beans, sowing in early Oct. gave the highest yield at all seed rates (50–500 lb./ac.) tested and time of sowing (early or late Oct., or mid-Nov.) had most effect on the yield of crops from the lower seed rates. The optimum economic seed-rate at all sowing dates was between 200–300 lb./ac. for both winter and spring beans. Straw length, height of lowest pod, and extent of lodging in winter beans tended to increase with rising seed-rate and to decrease with delayed sowing. In a winter-sown trial to compare yields produced by seed of 2 different sizes derived from the same stocks, the larger seed tended to give the higher yield.—M.P.

196 Way, M. J. and Needham, P. H. **Control of some bean and potato pests using a systemic insecticide applied to the soil and seed.** *Pl. Path.* 1957, **6**, No. 3, 96–103, bibl. 9, illus. [Rothamsted Exp. Sta., Harpenden, Herts.]

Results indicated that demeton, used in the trials at rates of 0·001–1·0 g. per seed or tuber, applied to the soil or as a seed dressing can control early attacks of *Sitonia lineata* on *Vicia faba* var. *minor* and of *Myzus persicae* on King Edward potatoes. In an unreplicated trial with potatoes, the insecticide appeared to be translocated to, and stored by, daughter tubers in quantities sufficient to kill *M. persicae* on young shoots. The trials demonstrate the potential value of control measures using systemic insecticides, but it is stressed that demeton has a high mammalian toxicity.—M.P.

197 Baird, Kathleen J. **Investigations on the root nodule bacteria of *Vicia faba* L.** *Phyton* 1956, **7**, No. 1, 47–62, bibl. 9, illus. [W. Scot. Agric. Coll., Glasgow]

In an investigation to study the native strains of *Rhizobium* of field beans in the west of Scotland, the effectiveness in N-fixation of 100 isolations was tested on field beans growing in water culture. A wide range of effectiveness was found, about 30 of the isolations being classed as ineffective. As there was no relationship between incidence of ineffective strains and type of crop obtained, it is concluded that seed inoculation would not necessarily be advantageous. Under field conditions it was found that at least 2, and possibly more, strains of the nodule organism of different N-fixing powers were associated with each plant tested. In plants growing in water culture, the number and type of nodules varied greatly from isolation to isolation and were not correlated in any characteristic way with the effectiveness of the strain.—From author's summary.

CROTALARIA SPP.

198† Mes, G. Margaretha and others. **A comparative study of the growth and yield of a number of *Crotalaria* species suitable for green-manuring.** *S. Afr. J. Sci.* 1957, **53**, No. 6, 181–5, bibl. 1, illus. [Pl. Physiol. Res. Inst., Univ. Pretoria]

A comparative study has been made of the growth characteristics of 9 *Crotalaria* species : *juncea*, *intermedia*, *incana*, *laburnifolia*, *mucronata*, *paulina*, *recta*, *spectabilis* and *usaramoensis*. *C. intermedia* was potentially a higher yielder ; had a longer growth period, more lateral branches, more and bigger leaves and more seeds, but its initial growth was slower than that of *C. juncea*. It was also palatable and non-toxic. *C. mucronata* and *C. paulina* yielded as well as *C. juncea* ; *C. spectabilis* also yielded well but its seeds needed scarification for good germination. Only the species *juncea*, *intermedia* and *mucronata* germinated satisfactorily without scarification.—From authors' abstract.

199† Mes, G. Margaretha and others. **A comparative study of the nitrogen content of a number of *Crotalaria* species suitable for green-manuring.** *S. Afr. J. Sci.* 1957, **53**, No. 6, 185–9, bibl. 4. [Pl. Physiol. Res. Inst., Univ. Pretoria]

The same 9 *Crotalaria* spp. [see previous abstract] were studied. The percentage N was lowest in whole roots, stems, petioles and pods (minus seeds). For several species, the average N content of the leaves was higher than in clovers. The total-N content of whole plants was dependent on the dry-weight yield, the percentage N in the various organs and the ratio of leaves and pods to stems. A maximum amount of 7 g. of N/plant was found in *C. recta* and *C. intermedia*.—From author's abstract.

VETCH

200† Steikhardt, H. Bericht über die Versuche " Körnergewinnung von Zottelwicken in Roggen ". [**A report on the trial : " seed harvest of hairy vetch when grown with rye ".**] *Dtsch. Landw.* 1957, **8**, No. 8, 393–4, bibl. 5. [Inst. Landw. und Untersuchungswesen, Jena, E. Germany]

To find out the best proportions of rye and vetch for vetch-seed production, 5, 15 and 30 kg./ha. *Vicia villosa* were added to rye at sowing rates normal for each of the 5 localities. *V. villosa* at 10–15 kg./ha. proved to be the most satisfactory. Where rainfall exceeded 600 mm., 5 kg. was sufficient, but where the soil was dry and light, 20–30 kg. was better. The date of harvesting the mixture was fixed by the ripening of the grain. At this date the lower pods on the vetch are also ripe.—D.B.

201† Cantillon, P. La production de graines de vesce commune de printemps. [**Seed production of common spring vetch.**] *Rev.*

Agric., Brux. 1956, **9**, No. 9, 1073–7. [Sta. Rech. État, Gembloux, Belgium]

A series of trials was carried out in 1955 to study the association of common spring vetch [*Vicia sativa*] with wheat or oats, sown in different proportions and grown with different amounts of N fertilizer. It was shown that the best results (highest total seed yields) were obtained when N was applied at 150 kg. of ammonium nitrate per ha. and from the mixtures in which the cereals were used in the highest proportions and vetch in the lowest ; these mixtures gave the best cereal grain yields although the vetch yields were relatively low. With wheat, the mixture wheat 160 kg. + vetch 30 kg./ha. gave 3418 kg. of wheat and 407 kg. of vetch. With oats, the mixture oats 120 kg. + vetch 30 kg./ha. gave 4060 kg. of oats and 420 kg. of vetch. [See also *Fld Crop Abstr.* 9 : 130.]—E.B.O.

CHICKPEAS

202 LAUMONT, P. and CHEVASSUS, A. Note sur l'amélioration du pois chiche en Algérie. [**Note on the improvement of chickpea in Algeria.**] *Ann. Inst. agric. Algér.* 1956, **10**, No. 2, 24, bibl. 13, illus.

While the indigenous population does not discriminate against dark-skinned seeds, commercial demands are for light-coloured seeds. The improvement programme seeks homogeneous, productive varieties, resistant to disease and suited to culinary and commercial uses and therefore excludes the rose-flowered, dark-skinned varieties. Seed shape and surface conformational characters are described together with seed assessments according to weight and sieve-size. Sowing rates are recommended on the basis of seeds/ounce and the official cultural advice is included in the appendices together with a classification of tested varieties.—M.H.P.

203 SANLIER-LAMARK, Regina and CABEZAS de H., Eulalia. Estudio de la infección del garbanzo por el género *Rhizobium*. [**A study on chickpea inoculation with the genus *Rhizobium*.**] *An. Edafol. Fisiol. veg.* 1956, **15**, No. 12, 943–62, bibl. 8, illus., English and French summaries.

The method presented for inoculating chickpea (*Cicer arietinum*) with its specific strain of *Rhizobium* produces a more abundant nodulation than is usually obtained with this plant. It was shown that this *Rhizobium* strain produces nodulation in other legume species also.—E.B.O.

204 SEN, N. K. and JANA, M. K. **Broadcasting vs. line sowing in gram.** *Allahabad Fmr* 1956, **30**, No. 3, 115–17, bibl. 1. [Indian Inst. Technol., Khargpur] [Received Aug., 1957]

Experiments with *Cicer arietinum* were conducted on highland lateritic, sandy-loam soil in West Bengal. When sown in lines at spacings of 18 × 12, 18 × 9, 12 × 12, 12 × 9 (in.) yields were significantly higher than when broadcast at 40 lb. per acre, and, at spacings of 12 × 12 or 18 × 9 (in.), significantly higher than when broadcast at 80 lb. per acre. The optimum line-spacing was 12 × 12 in.—D.B.

LUPINS

205† HACKBARTH, J. Der Entwicklungsrhythmus bei *Lupinus albus* und seine Bedeutung für Anbau und Züchtung. [**The developmental rhythm in *Lupinus albus* and its importance for cultivation and breeding.**] *Z. PflZücht.* 1956, **36**, No. 4, 434–44, bibl. 9, illus. [Max-Planck-Inst. ZüchtForsch., Zweigstelle Scharnhorst]

The early-maturing, short form of *L. albus* is the best type for Central Europe. When sown early it remains short, but when sown late (end of April) there is strong and tall vegetative growth, the change to the reproductive phase is delayed, and the period between sowing and maturity is lengthened to 195 days. The cause of this phenomenon was found in a heat-sensitivity possessed by the short forms of *L. albus* in the early stages. The vigorous vegetative growth is undesirable when growing *L. albus* for seed (though not for fodder) ; it can be countered by selection for heat-neutral strains or by vernalization.—D.B.

GENERAL

206† BHIDE, V. P. **Cross inoculation studies with some rhizobia of the cowpea group.** *Indian Phytopath.* 1956, **9**, No. 2, 198–201, bibl. 8. [Coll. Agric., Poona]

In cross-inoculation trials with root-nodule organisms from some members of the cowpea group, groundnut was not nodulated by 2 isolates from chavli (*Vigna catjang*). Shevri (*Sesbania aegyptiaca*) was nodulated by organisms from all the cowpea-group plants used and its own organisms nodulated all the hosts, viz. chavli, groundnuts, udid (*Phaseolus radiatus*), mung (*Ph. aureus*) and sunn-hemp (*Crotalaria juncea*). It is, therefore, a new addition to the cowpea group. *Desmodium diffusum* should also belong to the cowpea group since it was nodulated by organisms from authentic members of that group. Soyabean was also nodulated by organisms from members of the cowpea group indicating that cross-inoculation between the cowpea and soybean groups is possible.—From author's summary.

207† RAGGIO, M. and others. **The nodulation of isolated leguminous roots.** *Amer. J. Bot.* 1957, **44**, No. 4, 325–34, bibl. 16, illus. [Bot. Dep., Univ. California, Berkeley]

ROOTS

SUGAR-BEET

208 Rimačenko, V. S. [**Cultivation of monogerm sugar-beet in the Altai.**] [Russian] *Sahar. Promyš.*, 1957, No. 2, 59.

Monogerm seed was drilled to a depth of 3 cm. at the rate of 30 and 15 kg./ha., respectively, in two replications on a 15-ha. field. In one case the yield was 30·0 t./ha. and the sugar content 13·99% as compared with 23·2 t./ha. and 13·95% with the sugar-beet grown from normal seed. A sowing of 15 kg./ha. gave considerably lower yields.—From *Agric. Hort. Engng Abstr.* 1957, 8, Abs. 842.

209 Šinkarenko, B. M. [**Experiment on sowing monogerm beet seed.**] [Russian] *Sahar. Promyš.*, 1957, No. 3, 52.

The experiments were conducted on 2·47-ha. plots of chernozem with a tractor drill sowing normal sugar-beet seed at 32 kg./ha. and monogerm seed at 32, 20 and 16 kg./ha. The respective stands before thinning were 67, 51, 30·4 and 23·4 plants per m., and the yields (after a late thinning and hoeing) 30·2, 29·6, 29·3 and 28·8 t./ha. Taking the labour requirement for thinning and hoeing the beet grown from normal seed as 100% (29·2 man-days per ha.), the requirements on the other 3 plots were 94, 89 and 83%, respectively, and it is considered that these figures could have been further reduced by mechanical gapping.—From *Agric. Hort. Engng Abstr.* 1957, 8, Abs. 844.

210 Ballatore, G. P. and Terregino, S. Esperienze sull'epoca di semina della barbabietola da zucchero in coltura asciutta, in Sicilia. [**Trials on sowing date of non-irrigated sugar-beet in Sicily.**] *Ann. Sper. agr.* 1957, **11**, No. 2, 529–44, bibl. 2, illus., English summary. [Ist. Agron., Univ. Palermo]

Results from trials at Ricalcata near Trapani and other localities in Sicily indicated that the variety Dippe E is adapted to early sowing (October) and Kleinwanzleben AA to late sowing (February) but that the highest yields were always obtained from the variety Pedigrè E, sown in autumn. Early and late sowings of sugar-beet in Sicily can take place only where irrigation is available; in non-irrigated areas sugar-beet must be sown in November. With the same sowing date, yields increased where the plant density was raised from 7 to 10 plants per sq. m. On clay soil, Pedigrè E grown at 10 plants per sq. m., yielded 7140 kg. of sugar per ha.—E.B.O.

211 Comarnescu, V. and others. Rezultatul experienţelor la plantatul butaşilor de sfeclă de zahăr tăiaţi în jumătăţi şi sferturi. [**Experimental results with sugar-beet stecklings cut into halves and quarters.**] *Anal. Inst. Cerc. agron. Român.* 1955, **22**, 243–54, bibl. 2, French and Russian summaries. [Romania] [Received July, 1957]

In warm-autumn years, the supply of stecklings may be insufficient, owing to deterioration. Stecklings were multiplied by cutting into 2 or 4 pieces at 3 experimental stations. At Moara Domnească, the yields of seed obtained from complete, half- and quarter-stecklings were 625, 503 and 369 kg./ac., respectively; at Cîmpia Turzii, the yields were 2048, 1804 and 1522, and at Tg. Frumos 1530, 1512 and 1215 kg./ac., respectively. Although at Moara Domnească, more total seed is obtained by planting divided stecklings, the yield/ha. is low, and the cutting of stecklings is rarely to be recommended. At the other 2 stations, the use of halves is permissible both for élite and ordinary seed.—From authors' summary.

212 National Institute of Agricultural Botany. **Sugar beet seed growing experiment.** *37th Rep. nat. Inst. agric. Bot., Camb. 1956* [n.d.], 33. [Received Aug., 1957]

Nitrogen, at 0, 5 or 10 cwt./ac. had no effect on seed yield in the wet year of 1956, when harvesting had to be delayed, whereas in the dry year of 1955, N-additions considerably increased yields. Average seed yields from 9-, 18- and 36-in. spacings in drills 27 in. apart were in the ratio 3 : 2·5 : 1·5. Topping gave no significant increase in yield at any spacing or N-level, but reduced the size of the plants and their tendency to fall over. In an experiment on steckling crown sizes, large crowns (over 1 in.) gave 25% greater yields than stecklings under 1-in. crown.—M.P.

213 Thompson, E. G. **Trials of commercial strains of sugar beet.** *Brit. Sug. Beet Rev.* 1957, **25**, No. 4, 151–3 and 167. [Nat. Inst. Agric. Bot., Cambridge]

Tables show average results from some 15–18 trials carried out to test 14 sugar-beet strains in Gt Britain in 1954–6. The data given separately for the 3 years are: sugar yields, yields of washed roots, yields of tops, percentages of sugar in the roots,and percentages of bolters at harvest.—E.B.O.

214 Great Britain. National Institute of Agricultural Botany. **Strains of sugar beet. Recommended list.** *Fmrs' Leafl. 5 (Revised) N.I.A.B.* 1957, pp. 4.

The performance, during 1954–6, of the 9 recommended and 4 provisionally recommended strains of sugar-beet is recorded together with brief notes on each strain.—M.P.

215 Meier, W. Ergebnisse der Sortenprüfung bei Zuckerrüben 1954–1956. [**Results of sugar-beet varietal trials 1954-6.**] *Mitt. schweiz. Landw.* 1957, **5**, No. 5, 92–4. [Eidg. Landw. Versuchsanst., Lausanne, Liebefeld-Bern, Zürich-Oerlikon]

Four foreign varieties, Kleinwanzleben N (German), Hilleshög K and Hilleshög Polyploid (Swedish) and Beta K-91 (Hungarian), completed their 3-year trials during which they were compared with Kleinwanzleben Polybeta for yields and resistance to *Cercospora* [*beticola*]. Average results from 17 trials over 3 yr. are tabulated. In beet yield and sugar yield, the 2 Hilleshög varieties were the best ; in sugar content, the 2 Kleinwanzleben varieties. Sugar yield was greatest from Hilleshög Polyploid followed by Hilleshög K and Kleinwanzleben Polybeta. The highest yield of tops was obtained from Beta K-91. All except Kleinwanzleben N were strongly resistant to *Cercospora*. The highest financial returns were obtained from Hilleshög Polyploid, Kleinwanzleben Polybeta, and Hilleshög K. [See also *Fld Crop Abstr.* 10 : 164.]—D.B.

216 Statens Forsøgsvirksomhed i Plantekultur. Denmark. Forsøg med stammer af sukkerroe til fabrik 1952–1954. [**Varietal trials with sugar-beet, 1952-4.**] *Medd. 543 Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl.* 1957, **61**, No. 1, 149–53.

The trials reported were carried out at 10 locations on both clay and sandy soils with 3 Swedish, 1 German and 4 Danish varieties of sugar-beet. Kleinwanzleben Polybeta, Maribo P and Eagle Hill E were the highest yielding varieties and produced mean sugar yields of 72, 71 and 70 hkg. per ha. with mean sugar content of 17·2, 17·4 and 16·8%, respectively. Hilleshög K Polypl. was tested for 2 years only, and gave 71·5 hkg. sugar per ha. Its sugar content was 16·9%. Descriptions are given of each variety and data are given of their agronomic characters. —J.K.L.

217 Jahn-Deesbach, W. Über vororientierende Versuche zum Herkunftswert bei Zuckerrübensamen. [**Preliminary trials on the value of sugar-beet seed.**] *Z. Acker- u. Pflbau* 1957, **103**, No. 3, 337–46, bibl. 5, illus. [Inst. Acker- u. Pflbau, Univ. Jena, E. Germany]

Seed produced in 6 different areas not markedly different in climate but having different soils (3 heavy and 3 light) was tested in the laboratory for chemical composition, 1000-grain weight, and germination. The influence of the soil on which the parent plant was cultivated was most apparent in germination-rate and -energy of the seed. Heavier soils were superior to the light and sandy soils. A definition of " Herkunftswert" is given.—D.B.

218 Anghel, Gh. and Raianu, M. Determinarea facultăţii germinative a seminţelor de sfecla în laborator. [**Determination of the germination-capacity of beet in the laboratory.**] *Anal. Inst. Cerc. agron. Român.* 1955, **22**, 493–500, bibl. 4, French and Russian summaries. [Romania] [Received July, 1957]

The most favourable conditions for the laboratory germination of sugar-beet seed, obtained from 5 experiment stations in different regions of Romania, were constant 20°C. and a 60–70% moisture saturation of the substrate. Vigour and capacity of germination were determined after 5 days and 10 days, respectively. Wetting for 30 minutes before the test was recommended only in urgent cases.—From authors' summary.

219 Ripper, W. E. **A new method of selective weed control for related plants, in particular broad leaf weeds in beet.** *Proc. 3rd Brit. Weed. Contr. Conf.* 1956, 225–33, bibl. 7, illus. [Fisons Pest Contr. Ltd., Cambridge]

Using a machine specially designed for the purpose, the following method was carried out : (1) a seed furrow was opened and sugar-beet seed placed therein ; (2) the seed furrow was partly filled and, where necessary, consolidated ; (3) a narrow band of adsorbent (activated charcoal ± inert or adsorbent carriers) was sprayed or placed in the partly-filled furrow ; (4) the furrow was completely filled in and consolidated ; (5) a 6-12 in. band of pre-emergence weed-killer was sprayed on top of the soil. The herbicides tested included propham, monuron, diuron and MCPA. Use of the adsorbent protected the sugar-beet plants and also enabled higher concentrations of the herbicides to be used effectively and safely for the control of a number of weeds including *Polygonum aviculare, Chenopodium album* and *Convolvulus arvensis*. The method provided an economic and practical field control of broad leaved weeds in rape, with MCPA and propham, and of several grass weeds in wheat and barley.—M.P.

220 Bruns, V. F. **The response of certain crops to 2,4-dichlorophenoxyacetic acid in irrigation water. 2. Sugar beets.** *Weeds* 1957, **5**, No. 3, 250–8, bibl. 4, illus. [Irrig. Exp. Sta., Prosser, Wash.]

The application of 2,4-D at 2 and 6 lb./ac. in 3 ac.-in. of irrigation water caused a high mortality of sugar-beet seedlings (2–4 leaves) and reductions in stands at the 1-in.-diameter stage. The sucrose content of harvested beets was reduced by the 6-lb. treatment at the 1-in. stage. Analysis of leaf and petiole samples indicated a higher level of nitrate-N in treated than in untreated tissue 6–12 days after 2 lb. of 2,4-D had been applied at the 1-in. stage. The mean weight per beet and the sucrose content at harvest were correlated, positively and highly, with the final stand. The 6-lb. rate at the seedling stage and both rates at the 1-in. stage retarded the growth-rate of surviving beets.—From author's summary.

221 Dubourg, J. and others. Influence des engrais azotés sur la teneur en azote nuisible des betteraves. [**Influence of N fertilizers on the content of harmful N in sugar-beet.**] *Sucrerie franç.* 1957, **98,** No. 5, 139–42.

Results from trials carried out in Normandy with the sugar-beet variety Desprez E in which N was applied at rates of 0, 88, 160, 228 and 520 kg./ha., indicated that high amounts of N fertilizer increased considerably the content of glutamic acid in the roots, favoured the growth of leaves, lowered the sugar yield per ha., and increased the impurities in the juice.—E.B.O.

222 Coïc, Y. and Trunkenboltz, M. La nutrition et la fertilisation azotées de la betterave sucrière. [**N nutrition and manuring of sugar-beet.**] *C.R. Acad. Agric. Fr.* 1957, **43,** No. 10, 559–63, bibl. 2. [Inst. Nat. Rech. Agron., Paris]

In a trial with the sugar-beet variety Klein N sown on 5 April, the same amount of N, 180 kg./ha., was applied to all plots, but in 2 instalments at different dates. Highly significant results were obtained showing that yields were higher with earlier applications of N. The highest yield, 58·5 metric tons of roots/ha., was obtained by applying 70 kg. N on 5 April and 110 kg. on 25 May.—E.B.O.

223 Commissie ter Bevordering der Suikerbietenteele in de Noordelijke Provinciën. Rapport over 1956. [**Report for the year 1956, of the Commission for the Promotion of Sugar-beet Cultivation in the Northern Provinces, Netherlands.**] *Meded. Inst. rat. Suikerprod.* 1957, **27,** 97–181, illus.

1. Date-of-sowing, pp. 104–6. Three varieties, Kleinwanzleben E, Kuhn P and Maribo Polyploid were sown (dibbled) in good weather on 26 March and 13 April, and singled on 8 May and 14 May, respectively. Plants from the earlier sowing were better developed in the first week of June than those from the second sowing, but subsequently exhibited a considerably larger percentage of bolters. Varietal differences in yield and sugar weight are recorded, Maribo Polyploid giving the highest sugar weight, followed by Kleinwanzleben E ; but there was little difference in the results obtained from the earlier and the later-sown crops.

2. Green manuring, pp. 106–14. Colza, turnips, yellow mustard and Siletta, which is a bred variety of *Raphanus sativus oleiferus*, were sown in August and harvested in November. They received 3 treatments viz. 0, 150 and 300 kg. N per ha., and were subsequently compared for their manurial effect on sugar-beet (Maribo Polyploid), planted (dibbled) in the following April. Before planting the beet, N was applied to the plots at the rates of 60 and 120 kg. per ha. Thus N was applied in the autumn, to the green manure crop, and in the spring, to the sugar-beet crop. The results obtained are recorded in 8 tables dealing with different aspects of the trial, viz. effect of the green manure and N-treatments upon leaf- and root-yield, sugar content and sugar yield of the beet ; effect of green manuring upon the metabolism of the beets through conduction capacity in the sap (this was low, and differences between the different treatments were slight) and injurious nitrogen content (also low, but generally somewhat higher when the dressing of N was higher) ; results regarded as a trial of different times of applying N ; results from the viewpoint of different spring applications of N ; results purely as a green-manuring trial, wherein Siletta produced the best root yield, sugar content and sugar yield ; combinations of green manuring with autumn dressing of N and with spring dressing of N, respectively ; and chemical analysis of the different yields obtained.

3. Singling, pp. 115–8. Comparison of 3 treatments, in the first of which normal singling was done, in the second the smallest plants only and in the third the largest plants only were left in the field, the number of plants retained, however, being as far as possible the same in each treatment. The experiment took place in 3 localities, and the tabulated results in leaf- and root-yield, sugar content, sugar yield and number of plants per acre, demonstrate the advantage of retaining the largest, i.e. the best-developed plants at singling.

4. Manuring with N, pp. 118–20. Comparison of different times of application. The four treatments compared were the application, per hectare, of (a) 600 kg. nitrochalk on preparing the land for sowing ; (b) 600 kg. nitrochalk over the furrows about 14 days before sowing ; (c) 300 kg. nitrochalk on preparing the land and 400 kg. Chilean nitrate on singling ; (d) 300 kg. nitrochalk over the furrows about 14 days before sowing and 400 kg. Chilean nitrate on singling. Of treatments (a) and (b), (b) gave the best results in root- and sugar-yield. Treatments (c) and (d) gave similar results. Splitting the application of N so that 400 kg. Chilean nitrate was given on singling produced about 900 kg. more roots and 4300 kg. more leaf per hectare than a single dressing of 600 kg. nitrochalk per hectare.

5. Weed control, pp. 121–4. Trials were made of spraying different quantities of IPC, 50% active substance (7·5 and 5 kg. in 800 l. water per ha.), at different times, viz. 14 days and 7 days before sowing the sugar-beet, and when the crop plants had 2–4 leaves. There was little difference in the figures for yield after the different treatments ; only after spraying with 7·5 kg. IPC 7 days before sowing was there a definite diminution in leaf-, root- and sugar-yield in comparison with the untreated and the remaining IPC treatments. In

the control of *Alopecurus myosuroides* the best results were achieved by spraying the furrows before sowing the beet. *Poa annua* is apt to germinate just when the sugar-beet is coming up, and for the control of this grass treatment when the beet plants have 2–4 leaves can be useful.

6. Topdressing with K and P, pp. 124–7. There was little difference in the yields obtained after different top-dressings, and no definite conclusions were reached.

7. Cross-hoeing, pp. 127–8. An experiment in thinning by means of a Russian system of cross-hoeing is described. The average number of plants remaining per hectare was 63,000, which is considered undesirably low : with the normal methods of thinning the number is 69,000. There was no great saving of time through the use of the Russian method and it is not considered to offer much advantage.

8. Nitrogen dressings, pp. 129–30. Comparison of the application of 90, 120, 150 and 180 kg. N per hectare in one dressing on 6 April after the sowing of the sugar-beet variety Maribo P, and on 4 April to Kleinwanzleben E sown on 6 April, demonstrated that 120 kg. N per ha. is sufficient to produce optimal sugar yield and that there is no advantage in applying larger doses.

9. Effect upon sugar-beet yield of different forms of N and different amounts of K, pp. 131–5. In a trial with Kleinwanzleben E in the Veendam locality, the highest sugar yield was from the use of 240 kg. K_2O as K-60 per ha., with N in the form of Chilean nitrate. The highest leaf yield required a somewhat higher application of K. In a similar experiment in another locality the best results, apart from leaf yield, were obtained from 360 kg. K_2O per ha.; and Chilean nitrate resulted in higher leaf-, root- and sugar-yield than nitrochalk, but the sugar content was the same under both forms of N.

10. Effect upon yield of increasing quantities of K, p. 136. The quantities tested ranged from 120 to 480 kg. K-40 per ha. In a one-year trial the highest sugar-, root- and leaf-yield came from using 200–240 kg. K-40 per ha. Larger quantities do no harm but do not increase yield.

11. Effect on sugar-beet yield of $Na_2O + K_2O$, in varying quantities, pp. 136–9. The highest sugar yield resulted from the use of two-thirds Na_2O + one-third K_2O, wherein a total quantity of 300 kg. per ha. was probably better than 600 kg. per ha. For leaf yield a total of 600 kg. per ha. gave the best result.

12. Spraying with manganese for the correction of Mn deficiency in sugar-beet, pp. 142–7. The effects of spraying once, twice and three times were compared. There was little effect on yield and results were not yet conclusive, but growers noting signs of Mn deficiency in young beet crops are advised to spray with a 1–1·5% solution of sulphate of manganese in 800 l. water per ha.

13. Control of wilt, pp. 148–51. Nine treatments, including disinfection of stecklings with different preparations, cold storage of stecklings, and soil disinfection, were tested for the control of beet wilt caused by *Verticillium* and *Phoma*. Although there was no serious incidence of the disease in 1956 and the average attack was only 4·5%, the percentage was lower when there was disinfection with sublimaat just before planting, followed by spraying with tuzet 2 or 3 weeks afterwards. Spraying with tuzet gave the highest seed yield.

14. Description and discussion of sugar-beet varieties, pp. 174–81, by F. Mulder.—G.M.R.

FODDER-BEET

224 Ivins, J. D. and Webster, T. **Plant populations of mangolds and fodder beet.** *Agriculture, Lond.* 1957, **64**, No. 1, 16–18. [Univ. Nottingham]

Four varieties, Yellow Globe, Barres C.B., Yellow Daeno XI and Hunsballe X, representing a range of types within the mangel and fodder-beet groups, were tested for 2 yr. (during which there was contrasting weather) to ascertain the influence of variety and plant density on yield. In all varieties, yields per acre of fresh root and dry matter increased as the plant density increased from 15,000 to 30,000 per acre. The latter density is recommended, as for sugar-beet. [Higher densities were not tested.] The differences between varieties were not great except for the lower yield of fresh roots of Hunsballe which resembles sugar-beet in growth. Yields of tops increased slightly on increasing the plant density from 15,000 to 30,000 per acre. For a given density, Hunsballe and Yellow Daeno gave the best, and Yellow Globe the lowest, yield of tops.—D.B.

225† Zijp, M. J. Resultaten officiële proefvelden voederbieten. CB-rassen in 1956 aan de spits. [**Results of official fodder-beet trials. CB varieties leading in 1956.**] *Meded. Cent. Bur., Rotterdam* 1957, **41**, No. 3, 53–4, illus. [Hoofddorp]

The Commission for the Testing of Fodder Plant Varieties conducted trials in 1956 of fodder-beet varieties in marine clay, river clay, loess and sandy soils. Figures taken from the official report on these trials are quoted to show the yield of dry matter and the tendency to bolt in some 26 varieties. The mean dry-matter yield for the years 1953–6 is also given. The CB variety Bison occupies the foremost place for both dry-matter yield and lack of tendency to bolt ; another CB variety, Groenkraag, took the second place.—G.M.R.

POTATOES

226 Flamini, B. Influenza della grossezza dei tuberi-seme e della densità di investi-

mento sulla quantità e la pezzatura del prodotto nella coltivazione della patata. [**Effect of size of seed-tubers and plant density on potato size and yield.**] *Ital. agric.* 1957, **94,** No. 7, 603–29, bibl. 47, illus. [Ist. Agron., Univ. Bologna, Italy]

The main results from 3 years' trials in the Bologna Plain were : (a) total yields increased as the density increased from 1·7 to 6·7 plants per sq. m. ; the largest tubers were obtained from the lowest plant densities and vice versa ; (b) total yields increased as the size of seed-potatoes increased from 30 to 120 g. ; the largest tubers were obtained from small seed-potatoes ; (c) total yields increased steadily, according to a logarithmic curve, with the quantity of seed employed, irrespective of plant density and size of seed-potatoes ; (d) the 2 varieties tested, Agnes and Jakobi, behaved in a similar way.—E.B.O.

227 LÜDDECKE, F. Die Dammkultur und das Quadratnestpflanzverfahren im Anbau der Konsumkartoffeln. [**Ridge cultivation and square-pocket-planting of table potatoes.**] *Z. landw. Versuchs- u. Untersuchwes. Rostock* 1956, **2,** No. 3, 162–75, bibl. 7, illus. [Rostock]

The results reported in *Fld Crop Abstr.* 9 : 1262 are presented in slightly fuller detail.—M.P.

228 JANNACCONE, A. Indagini sperimentali sull'investimento unitario nella coltivazione della patata precoce in Sicilia. [**Investigations on plant density of early potatoes grown in Sicily.**] *Ann. Sper. agr.* 1957, **11,** No. 3, 775–92, bibl. 19, English summary. [Ist. Agron., Univ. Catania, Sicily]

By reducing the spacing in the row from 20 to 10 cm., an increase in potato yield of 36% was obtained, and by increasing the weight of each sett from 10 to 20 g. the increase in yield was 58%.—E.B.O.

229 JENTJENS, P. and others. Kartoffelbau in Mittelgebirgslagen. [**Potato cultivation in upland regions.**] *Kartoffelbau* 1957, **8,** No. 6, 100–1. [Prüm, Donaueschingen and München, W. Germany]

An account is given, for the Eifel and Hunsrück areas and for the Black Forest, of climate, soil, cultivation practices, choice of variety (usually late to medium-late) according to location and the place of the potato crop in agriculture. H. Rühmann contributes an article on the special difficulties of using machinery on hill slopes. [See next abstract.]—D.B.

230 KARTOFFELBAU. Pflanzguterzeugung in Höhengebieten. [**Seed-potato production in upland regions.**] *Kartoffelbau* 1957, **8,** No. 6, 102–10.

The upland regions which stretch across the southern part of the German Federal Republic provide areas (some to replace areas lost in E. Germany) for the production of seed potatoes. Accounts of the topography, soil, climate, healthiness of each area with special reference to overwintering of the virus vectors, history and present organization of seed-potato production are given by several contributors. There is an account for each of the following regions : the Bavarian Forest (500–800 m.), Oberpfalz (which has "closed" areas), Rhön (350–500 m.), Oberfranken (500 m.), Badenwürttemberg, Upper Black Forest (650–1500 m., very healthy and the most recent area), Rheinland-Pfalz (where production of seed potatoes is a profitable farm enterprise), Eifel (a very healthy area), Hessen-Nassau (Vogelsberg and Odenwald), and Kurhessen (area being steadily reduced). [See also previous abstract.]—D.B.

231 CONSTANTINESCU, Ec. Rezultatele încercărilor comparative cu soiuri de cartof în cultura de vară. [**Variety trials of summer-sown potatoes.**] *Anal. Inst. Cerc. agron. Român.* 1955, **22,** 255–63, bibl. 4, French and Russian summaries. [Moara Domnească Exp. Sta., Bucharest Prov.] [Received July, 1957]

During 1949–52, tubers of 3 early, 2 mid-late and 1 late variety of potato were planted during 29 June–4 July after vernalization for 25–30 days. Yield increases over non-vernalized spring-planted tubers were 353–3900 kg./ha. according to variety. Yields of 8000–13,000 kg./ha. can be secured and still higher yields obtained by attention to mulching, fertilization and planting-date. For the Bucharest province, the early varieties Galben Timpuriu and Viola, and the late varieties Priska and Săpunar, favoured for its culinary qualities, were recommended. The best planting dates for early varieties were 10–20 July and for late varieties 25 June–10 July.—From author's summary.

232 COMARNESCU, V. and others. Contribuţii la stabilirea agrotehnicii diferenţiate a cartofului. [**The establishment of a differential agrotechnique in potato culture.**] *Anal. Inst. Cerc. agron. Român.* 1956, **23,** 61–82, bibl. 6, French and Russian summaries. [Măgurele, Cîmpia Turzii, Moara Domnească and Mărculeşti Agric. Exp. Sta., Romania]

Experiments were carried out for 3 years on planting-depth, ridging and mulching of potatoes. At Măgurele, situated in a region very favourable for potatoes, a planting depth of 7–12 cm. gave the best yields ; here tubers were also formed in the ridges. At Cîmpia Turzii, with a lower rainfall, 12-cm. depth was best and ridging did not improve the yield. At Moara Domnească situated in an unfavourable region, a planting depth of 12–17 cm. assured the best humidity and temperature conditions ; here ridging reduced yields. At Mărculesti, in a very unfavourable region, 12–17

cm. was suitable ; in dry years with hot summers, 17 cm. was best. Mulching with chaff, straw or fresh manure raised yields at the unfavourable locations. In areas liable to soil erosion a mulch of manure was best ; elsewhere chaff is recommended. Mulching reduced erosion by about 50%.—From authors' summary.

233 Kunkel, R. **Factors affecting the yield and grade of Russet Burbank potatoes.** *Tech. Bull. 62 Colorado Agric. Exp. Sta.* 1957, pp. 42, bibl. 2, illus.

Russet Burbank was compared with Katahdin, Triumph and Pontiac over 3 years on several soil types and the results showed that it can be competitively produced provided that the following are strictly carried out : planting before the end of the first week in May, soil moisture maintained at or near field capacity from planting to harvest, and attention to manuring especially with P. Early planting produced the highest yield and percentage grade but the lowest specific gravity. Adequate moisture raised the latter.—From author's summary.

234 De Bruin, H. P. Is het gebruik van arsenieten bij het doodspuiten van aardappelloof verontrustend ? [**Is the use of arsenites for killing potato foliage disquieting**?] *Landb-Voorl.* 1957, **14**, No. 6, 285–92, bibl. 3, illus. [Agric. Adv. Serv., North Groningen]

Oats, peas and beans are all liable to damage from arsenites, but the actual uptake of arsenic by these plants is slight. Oats, grown in two experimental fields which had been treated in the previous year with 30, 60, 100 and 200 l. sodium arsenite (AAmorta) per ha., showed little reduction in yield from the normal application of arsenite (up to 30 l. per ha.) [concentration not stated], but where 200 l. per ha. had been used the drop in yield was about 300 kg. grain and 1000 kg. straw per ha.—G.M.R.

235 Ministry of Agriculture. Northern Ireland. **Potato variety trials.** *Res. exp. Rec. Minist. Agric. N. Ire. 1955*, 1957, **5**, 161–9.

Results of trials carried out in many centres over a number of years with 1st- and 2nd-early and main-crop potato varieties are reported. New main-crop selections which compared favourably with the standard varieties are Ulster Beacon, Ulster Torch and Ulster Tarn. Promising new yellow-fleshed varieties were Ulster Malta, Ulster Gozo and P4/1. Notes on the new varieties are given.—M.P.

236 Constantinescu, Ec. and others. Contribuţii la raionarea soiurilor de cartof. [**The regional cultivation of potato varieties.**] *Anal. Inst. Cerc. agron. Rôman.* 1956, **23**, 203–45, bibl. 5, illus., French and Russian summaries. [Inst. Agron. Res., Bucharest]

During 1949–54, 14 potato varieties were tested at 7 experimental stations throughout Romania. Late varieties were superior in yield to early varieties, especially in the more humid and cooler districts. The highest virus-resistance was shown by the varieties Merkur, Voran and Ackersegen. The best table-varieties were Viola, Frühbote, Galben Timpuriu and Săponar; Merkur had the best culinary quality among the late general-purpose varieties. The best and most constant yields of all varieties were produced at Măgurele, where the best varieties were the late Priska (28,932 kg./ha.), Voran, Merkur and Ackersegen ; the medium-late Săpunar yielding 21,115 kg./ha. and the early varieties, Viola (18,811 kg./ha.) and Frühbote were also recommended. In the northeastern Moldavian steppe, Viola and Frühbote were the best early varieties and Priska (24,081–27,247 kg./ha.) and Săpunar the best late varieties. At Lovrin in the western part of the Banat steppe, Viola (16,658 kg./ha.), medium-early Galben Timpuriu, Merkur, Săponar and Frühbote, which can give 2 crops a year, were best. At Mărculeşti and Moara Domnească in the steppe and forest-steppe of the Danube plain, where conditions are less favourable, the best results were obtained with Galben Timpuriu (16,524–15,212 kg./ha.) and Viola ; Frühbote and Săpunar were also recommended.—From authors' summary.

237 Ríos, P. and others. Herbicidas en cultivos de papa, caña de azúcar, cebolla y zanahoria. [**Herbicides for potatoes, sugar-cane, onions and carrots.**] *Inf. 5 Serv. Shell Agric. Venezuela* [n.d.] pp. 41, illus.

To control weeds in potato crops the following preparations are recommended : DNBP, applied at the rate of 20 l. of the commercial product in 280 l. of water/ha., and CMU, at the rate of 1·5 kg. in 300 l. of water/ha. CMU gave good control of *Amaranthus* sp., *Portulaca oleracea*, *Eleusine indica* and *Sclerocarpus coffeaecola*. DNBP controlled effectively all the potato weeds, including *Kallstroemia* sp., but its action is of shorter duration than that of CMU.—E.B.O.

238 Hanf, M. Erfahrungen über die Unkrautbekämpfung mit Wuchsstoffen in Kartoffeln. [**Results of weed control in potatoes with growth regulators.**] *Mitt. biol. BundesAnst. Berl.* 1957, **87**, March, 59–61. [Limburgerhof, Germany]

Spraying was carried out with a number of compounds [no rates given] before emergence (14 days after planting), and 4, 7, 20–5 and 30–5 days after emergence. Early potato varieties were more susceptible to the herbicides than were late varieties. Only pre-emergence spraying caused no leaf-deformity and resulted in yields greater than

those from hand-hoeing. MCPA was less toxic than 2,4-D or 2,4,5-T.—M.P.

239 Thijn, G. A. Aardappelteelt en daglengte. [**Potato-growing and daylength.**] *Meded. NAK* 1957, **13**, No. 12, 120.

In the third of a series of articles, the connexion between daylength and the attack on potatoes by *Phytophthora* is discussed. Potatoes grown under short-day conditions are more susceptible than others to this attack.—G.M.R.

240 Roer, L. Forsøk med sprøytemidler mot tørråte (*Phytopthora infestans* (*Mont.*) *de By*) på potet. **Experiments with fungicides against late blight on potatoes.** *Forskn. Fors. Landbr.* 1957, **8**, No. 2, 125–38, bibl. 13, English summary. [Farm Crop Inst. Vollebekk, Agric. Coll. Norway]

A report is given of experiments during 1945–54 with different fungicides against late blight, using Grahm (Up to Date) and Kerrs Pink. Spraying gave an average increase in yield of 10% ; in years of severe blight attack there were increases of up to 25%. These increases resulted from larger individual tuber weights and not from an increase in the numbers of tubers. The copper-urea mixture casco-bio F6 gave the best result, but it is now out of production. Of the other preparations tested, Dithane Z 78 was the most effective. Bordeaux mixture had a very reliable fungicidal effect. There were no significant differences between Bordeaux mixture and the copper-oxychloride, copper oxide and captan preparations.—J.K.L.

241 van der Zaag, D. A. Overwintering en epidemiologie van *Phytophthora infestans*, tevens enige niewe bestrijdingsmogelijkheden. [**Overwintering and epidemiology of *Phytophthora infestans* and some new methods for its control.**] *Diss. Wageningen* 1956, pp. 68, bibl. 118, illus., English summary.

242 De Lint, M. M. Rentabiliteit van de bestrijding van de aardappelziekte. [**Profitability of controlling potato disease caused by *Phytophthora infestans*.**] *Landb Voorl.* 1957, **14**, No. 6, 280–4, bibl. 6. [Phytopath. Service, Netherlands]

Several years' study show that, provided the best means are used and treatment is applied at the most favourable times, the control of *Phytophthora infestans* on potatoes is always profitable, not only in the less susceptible varieties such as Voran, with 2 or 3 treatments, but also in the more susceptible varieties such as Bintje, which may require 6 treatments.—G.M.R.

243 Björling, K. and Sellgren, K. A. Besprutningstekniska försök mot potatisbladmögel (*Phytophthora infestans* (Mont.) De By). 3. Studier av skyddseffekten vid olika sprutsätt. [**Spraying technique against late blight. 2. Studies on the protection afforded by different applications of the fungicide.**] *K. Skogs Lantbr. Akad. Tidskr., Stockh.* 1957, **96**, No. 3, 191–9, bibl. 12, English summary. [Royal Agric. Coll., Uppsala, Sweden]

244 Houghland, G. V. C. and Cash, L. C. **Carry-over effects of PCNB applied to the soil for control of potato scab.** *Amer. Potato J.* 1957, **34**, No. 4, 85–8, bibl. 6, illus. [U.S.D.A., Beltsville, Md]

The results of experiments conducted during 1954–6 on the control of potato scab (*Streptomyces scabies*) indicated that PCNB was effective. When no further PCNB treatments were applied in the following season, the percentage of scabby potatoes increased 3–5 times. In the first season, 100 lb. were effective and 25 lb. may be sufficient.—From authors' summary.

245 Dilz, K. and Bijloo, J. D. De gevolgen van het gebruik van chloorgas als ontsmettingsmiddel van cultuurgrond. [**The injurious effect of using chlorine gas for destroying nematodes in a sandy soil.**] *Landbouwk. Tijdschr., Wageningen* 1957, **69**, No. 6, 467–70, illus., English summary. [Agric. Univ. Wageningen and TNO]

The injection of 250, 500, 1000 and 2000 g. Cl_2 into 1·2 sq. m. containers for the control of potato eelworm resulted in an acidification of the soil and an accumulation of chlorides ; the potato plants showing severe symptoms of phosphate deficiency and chloride poisoning. Two years after treatment the effect was still evident to a somewhat lesser degree.—From authors' summary.

246 Hoyman, W. G. **Potato seed treatments in 1956.** *Bi-mon. Bull. N. Dak. Agric. Exp. Sta.* 1957, **19**, No. 4, 129–30.

In 1956, 11 treatments were used on cut Sebago seed-potatoes to evaluate their control of blackleg [*Bacterium phytophthorum*]. Acidulated $HgCl_2$, semesan bel and a material containing catechol and streptomycin nitrate were the best dip formulations. The best dust contained 500 ppm. streptomycin nitrate and 7·5% captan.—From author's summary.

247 Lauer, F. I. and Krantz, F. A. **Formation of buds from callus tissue in the potato.** *Amer. Potato J.* 1957, **34**, No. 6, 158–64, bibl. 5, illus. [Dep. Hort., Univ. Minnesota, St. Paul]

Chisago potato tubers, with all eyes removed, produced bud-forming callus on stems, roots and seed pieces. With the exception of roots, callus developed only on surfaces of those cuts which exposed the vascular system. Callus formation on stems and tubers tended to be restricted to cut surfaces facing the base of the stem. Differences

in the formation of callus and wound-periderm are discussed and reinterpretation of wound-periderm formation is suggested.—From authors' summary.

248 Contrufo, C. and Levitt, J. **Protein changes associated with emergence of potato tubers from the rest period.** *Suppl. Pl. Physiol.* 1957, **32**, xxvi. [Univ. Missouri, Columbia]

Potato tubers were stored at 3°C. from September and half a tuber was transferred monthly to 26°C. for 10 days and the corresponding halves compared. In each of 2 years, the alcohol-insoluble N in the internal tissues increased to a maximum in the tubers transferred in December and decreased in those transferred in October. At 3°C., the maximum of such N was in the January tubers. The results agreed with 5-years' results obtained previously by direct protein extraction. Protein synthesis always increased to a maximum during the rest period. Sprouting began at the change-over to protein hydrolysis.—From summary.

249 Meletti, P. Risultati di un trattamento fitormonico su tuberi di *Solanum tuberosum* L. [**Results from treating *S. tuberosum* tubers with a plant hormone.**] *Nuovo G. bot. ital.* 1956, **63**, No. 2–3, 239–47, bibl. 15, English summary. [Ist. Bot., Univ. Cagliari, Italy]

In laboratory and plot trials, tubers of the potato variety Tonda di Berlino were treated with aqueous solutions of 2,4-D at 10, 50 and 100 mg./l., by keeping them in glass basins, the inner walls of which were covered with filter paper moistened periodically with the 2,4-D solutions. The basins were kept closed but the air was changed frequently. In other plot trials, the tubers were treated after planting by applying the 2,4-D solutions to the soil. All treatments with 2,4-D solutions at 10 mg./l. resulted in the growth of a greater number of buds, plants of greater development and above-normal yields. Treatment with solutions at 50 and 100 mg./l. either had no effect or had a depressing effect on growth. In a plot trial where tubers were treated for 3 and 6 days in the glass basins, the yields were up to 100% more than from the controls.—E.B.O.

250 Viirsoo, E. V. El valor amiláceo de las papas autóctonas de Bolivia y Perú. [**The starch content of native potatoes from Bolivia and Peru.**] *Rev. agron. noroeste argent.* 1956, **2**, No. 1, 197–224, bibl. 12, English summary. [Fac. Agron., Univ. Nac. Tucumán, Argentina]

The specific weight and starch content are given of 561 samples of native potatoes [*Solanum* spp.] from Bolivia and Peru. It was found that about 9% of the material studied has more than 30% starch content. In particular, Chaquillos do Pomacanchi and Pucamoma from Peru have a starch content of 33·2%. The samples from Peru have a higher average starch content than those from Bolivia.—From summary.

251 Hansen, F. and others. Undersøgelser over danske kartoflers sammensaetning og ernaeringsmaessige vaerdi. **Investigations on the composition and nutritive value of Danish potatoes.** *Tidsskr. Planteavl.* 1957, **61**, No. 2, 292–376, bibl. 48, English summary. [State Res. Plant Cult., Univ. Biochem. Inst., Copenhagen]

252 Nordnes, Thora and others. Matpoteten belyst ved norske analyser. I. En vurdering av naeringsinnhold med spesiell vekt på C-vitamin. **Norwegian analyses of potatoes. 1. An evaluation of the nutrients with special regard to Vitamin C.** *Forskn. Fors. Landbr.* 1957, **8**, No. 1, 43–59, illus., English summary. [State Res. Inst., Norway]

253 Cárdenas, M. Estudio de los grupos taxonómicos de las papas silvestres. [**A study of the taxonomic groups of wild potatoes.**] *Turrialba* 1956, **6**, No. 3, 59–66, bibl. 18, English abstract. [Univ. Mayor de San Simón, Cochabamba, Bolivia]

The taxonomy of the wild potatoes is reviewed and discussed, information being given mainly on the many species present in Bolivia. These are included in the series Tuberosa, Circaeifolia, Acaulia and Commersoniana.—E.B.O.

254 Ingebrigsten, S. Gjødslingsforsøk i poteter. **Fertilizer experiments with potatoes.** *Forskn. Fors. Landbr.* 1957, **8**, No. 2, 139–82, bibl. 11, English summary [Agric. Coll., Norway]

The results are given of fertilizer experiments with potatoes in south-eastern Norway carried out during 1944–55. Application of 150 kg. mixed fertilizer per decare, in addition to 3 tons of farmyard manure, gave the highest yield of tubers; higher rates of application decreased the yield of both tubers and dry-matter. The dry-matter percentage decreased steadily from the lowest to the highest rate of fertilizer application. Experiments with N-, P- and K-fertilizers applied separately, showed that both N and K lowered the percentage starch in the tubers — P did not affect the starch content. In experiments with different times of application, a decrease in tuber yields was found when part of the N- and K-fertilizers was applied during the growth period. Application during hoeing did not reduce yields as much as did applications during flowering.—J.K.L.

255 Kürten, P. W. Stickstoffdüngung und Eiweissgehalt von Kartoffeln. [**Nitrogen manuring and protein content of potatoes.**] *Kartoffelbau* 1957, **8**, No. 7, 128–9, bibl. 6. [Ruhr Stickstoff A G., Bochum]

The following results were obtained from twenty-two 3-yr. manurial experiments. 80 kg./ha. N, as $(NH_4)_2SO_4$, gave an increase of 160 kg./ha. crude protein or 140 kg./ha. digestible protein. Application of the fertilizer in 2 stages (at planting and just before flowering) produced no increase, either in total yield or in protein content, above the yield obtained when the whole quantity was applied at planting. The late application of fertilizer increased the danger of virus infection.—D.B.

256 Buchner, A. Zur Blattdüngung der Kartoffeln mit Stickstoff. [**Leaf-manuring of potatoes with nitrogen.**] *Kartoffelbau* 1957, **8**, No. 5, 94. [Landw. Versuchsstat. Limburgerhof/Pfalz, W. Germany]

Urea, up to a rate of 10–20 kg./ha., applied with Bordeaux mixture to the leaves of potatoes grown for ware and for starch, improved the control of *Phytophthora* and the tuber yields. N given as a leaf manure does not replace the N manuring at or before planting. No recommendation can yet be made for potatoes grown for seed.—D.B.

257 Timm, H. **The influence of the chloride ion upon potatoes.** *Diss. Abstr.* 1957, **17**, No. 5, 944. [Pennsylvania State Univ.]

Soil and potato-leaf Cl-assays were conducted in 1953 on 49 farms, and in 1953 and '54 the effects of KCl and K_2SO_4 were compared as regards yield and quality, Cl-assays being made of the soil, leaves and tubers. The Cl-content of leaf tissue ranged from 0·56 to 2·35% of the dry matter. Where the level of replaceable soil-K exceeded 250–300 lb./ac., increases in tuber yield were not obtained with additions of over 80 lb./ac. of potash, and, in some cases, increased additions decreased the yields and specific gravity of tubers. At the same K-level, KCl caused a greater reduction in specific gravity than K_2SO_4. The leaf Cl-content was greatest where no N was applied. When available Cl was low, the stem end of the tuber was lower in Cl than the bud end. Application of KCl raised the total tuber-Cl and caused the stem end to exceed the bud end in Cl-content. In the stem end, the content ranged from 0·08 to 0·72% of the tuber dry-matter, and in the bud end from 0·11 to 0·50%.—J.F.C.

258 Baden, W. Düngung und Leistung der Kartoffel. [**Manuring and productivity of potatoes.**] *Kartoffelbau* 1957, **8**, No. 4, 74–6, bibl. 2, illus. [Staatl. Moor-Versuchsstation, Bremen, W. Germany]

After deep ploughing, the peat-bog land of N.W. Germany can be used for potato-growing. This bog is in a state of transition to sandy heath. To obtain good crops the ploughing must be deep enough to bring up the sandy layer and the surface water must be drained off to a sufficiently low level. Variations of soil pH within 3·6 and 4·2 scarcely affected the yield and an application of 1000–2000 kg. CaO/ha. at the beginning of cultivation sufficed. The most important factor in producing good yields was mineral N and this was applied up to 120 kg. N/ha.—D.B.

259 Ris, J. Bemesting van aardappelen en rogge op een lichte zandgrond. [**Manuring of potatoes and rye on a light sandy soil.**] *Landb Voorl.* 1957, **14**, No. 7, 324–30, bibl. 2. [Inst. Soil Fertility, Groningen]

Potatoes and rye were grown on a light, sandy soil (3·8% humus) in alternate years from 1947 to 1955. Through variations in the application of N, P, K, Ca and Mg, the optimal doses of these fertilizers could be determined. Farmyard manure supplemented by an application of N had a better effect than artificial fertilizers alone when the Mg level was unsatisfactory, but with an adequate Mg supply, there was no advantage in using f.y.m. rather than artificials alone.—G.M.R.

260 Dios, R. and Bará, S. Análisis foliar. 3. Control de la nutrición de patatas cultivadas en suelo heterogéneo en relación a su desarrollo y tratamiento de fertilizantes. [**Foliar diagnosis. 3. Control of the nutrition of potatoes grown in heterogeneous soil in relation to their development and manuring treatment.**] *An. Edafol. Fisiol. veg.* 1956, **15**, No. 12, 865–902, bibl. 9, English summary. [Mis. Biol. Galicia, Pontevedra, Spain]

Results are given from a field trial carried out to study, by means of foliar diagnosis, the main nutritional factors which influence potato yields. The soil of the trial was sandy with a medium content of total N and good percentages of available P and K. The addition of N and K to the soil increased the content of these elements in the leaves. The Ca content in the leaves decreased with K manuring. Mg increased with plant age.—From summary.

261 Farm Implement and Machinery Review. **New way to deal with potato haulms. The potato haulm pullers.** *Fm Impl. Rev.* 1957, **83**, No. 989, 707–8.

In 2 editorial articles, attention is drawn to recent developments in the Netherlands for disposing of potato haulms prior to harvesting by mechanical haulm pullers. The [pulling] action is performed by a pair of air-filled rubber rollers, which exert just sufficient pressure to gather the tops, which are then passed on to a chopper. The main advantages of this technique are : the haulms are fully disposed of ; the crop is neither injured nor exposed ; the full potato ridge can be taken ; the machines perform equally well on all classes of land, in all weathers and on early- and main-crop

potatoes. From 2·5 to 5 ac. a day can be dealt with depending on the conditions of land, tops, crop and weather. [For an official account of their development, see *Fm Impl. Rev.* 1957, 83, No. 990, p. 886.]—M.P.

262 De Lint, M. M. and Boogaard, E. W. Het loofklappen en doodspuiten in 1956. [**Destruction of potato foliage by mechanical and chemical means in 1956.**] *Landb Voorl.* 1957, **14,** No. 7, 308–17, bibl. 4, illus.

For medium-early varieties spraying once or twice was adequate, and, in general, twice for the late varieties. Chemical destruction was facilitated by the wet summer weather. As in previous years, there was less regrowth after the use of sodium arsenite (in the form of " AAmorta ") than after DNC in oil. With the normal amount of spray (500 l./ha.) ridge-spraying gave rather better results than broadcast spraying. Regrowth was most marked after ridge-spraying with half the normal amount of spray. No advantage accrued from doubling the amount to 1000 l. per ha. Regrowth after the second spraying was least when this was done as late as possible, i.e. 9–12 days after the first. Compared with leaf-stripping, mechanical beating combined with spraying gave a somewhat higher total yield of tubers, fewer green or *Phytophthora*-infected tubers, but more *Rhizoctonia*-infected tubers.—G.M.R.

263 Bulletin Technique d'Information. La conservation rationnelle du plant de pomme de terre. [**The rational storage of seed potatoes.**] *Bull. tech. Inform.* 1957, No. 120, 327–50, bibl. in text, illus.

This is a report of a French mission to study methods of storing seed potatoes in the Netherlands.—E.B.O.

264 Kraggerud, H. Kunstig ventilasjon av potetlagerrom på gårdbruk. Kunstig ventilasjon gir sikrere lagring og bedre utnyttelse av lagerrommene. [**Forced ventilation of potato-stores on farms provides safer storage and better utilization of storage-space.**] *Norsk Landbr.* 1957, **22,** No. 17, 343–4, illus. [Agric. Coll. Norway]

Results from Norwegian potato-storage experiments during 1950–4 showed the necessity for air-circulation. Natural ventiliation did not give as good results as did forced ventilation. Forced ventilation also enabled potatoes to be stored safely to a height of 2–3 m. The best temperature was found to be 2–3°C. in the store and from 3–5°C. among the potatoes.—J.K.L.

265 Kraggerud, H. Kunstig ventilasjon av potetlagerrom på gårdsbruk. Dimensjonering av vifta. [**Forced ventilation in potato-stores on farms. Dimensioning of fan.**] *Norsk Landbr.* 1957, **22,** No. 18, 370, illus. [Agric. Coll., Norway]

Storage-experiments with potatoes were carried out to determine the necessary air-changes when potatoes were stored at different heights. It was found that 200 cu. m./ton/hr. was needed at storage-heights of 2–3 m., and 100 cu. m./ton/hr. when the potatoes were stored 1–2 m. high.—J.K.L.

266 Ophuis, B. G. **The effect of ventilation capacity on weight losses in ventilated potato stores.** *Neth. J. agric. Sci.*, 1957, **5,** No. 3, 180–94, bibl. 7. [Inst. Storage Proc. Agric. Products, Wageningen]

The ventilation capacity required for cooling potatoes depends on the climate and is best determined by practical experiments. Increasing the quantity of air forced through per hour results in little or no increase in evaporation. Hence with a large ventilation capacity shrinkage is not higher than with a small ventilation capacity. The ventilation capacity recommended for potato stores in the Netherlands is 100 cu. m. air per hour per cu. m. potatoes. Under Dutch climatic conditions it is thus possible to obtain a storage temperature corresponding to the minimum outside temperature averaged per 10-day periods. Up to April these temperatures are low enough to prevent sprouting. In ventilated potato stores the loss of weight in immature harvested potatoes is 3–5% during the first month after harvesting, and one-half to a maximum of two-thirds % per month in the succeeding period. Ripe lifted potatoes have a weight loss of 1–3% in the first month and one-half to two-thirds % per month thereafter.—From author's summary.

267 Linser, H. and Beck, W. Zur Frage der Beeinflussung des Geschmacks von Speisekartoffeln durch moderne Kartoffelkäfer-Bekämpfungsmittel. [**The effect of insecticides used at the present time for Colorado beetle control on the flavour of ware potatoes.**] *PflSchBer.* 1957, **19,** Jubilee number, 63–73, bibl. 13, English summary. [Österreich. Stickstoffwerke A.G., Linz/Donau]

Treatment, at standard rates, with lindane, lindane-toxaphene and DDT in suspensions, and lindane-toxaphene in an emulsion imparted a flavour to the potatoes, but the flavour was not objectionable.—D.B.

SWEET-POTATOES

268 Hall, C. V. and Greig, J. K., Jr. **Influence of chemical treatments on sprouting of sweetpotato roots.** *Proc. Amer. Soc. hort. Sci.* 1956, **83,** 417–20, bibl. 5, illus. [Kansas State Coll., Manhattan]

Ethylene chlorhydrin applied at 175 ppm. as an instant dip removed proximal dominance from

Porto Rico and especially from Jersey-type roots. Sprout production was stimulated in Nemagold roots.—From authors' summary.

269 Paterson, D. R. **Some effects of pre-harvest foliage sprays of maleic hydrazide on proximal dominance and sprout inhibition of sweet potatoes.** *Bot. Gaz.* 1957, **118,** No. 4, 265–7, bibl. 14, illus. [Texas Agric. Exp. Sta., College Sta.]

In field trials, MH at 4000, 8000 and 16,000 ppm. applied as foliage sprays to sweet-potatoes var. Porto Rico 1 month before harvest significantly reduced sprouting in roots bedded after storage. MH at 2000 ppm. caused loss of proximal dominance on the root and sprouting was normal in the variety Porto Rico, whereas in the variety Gold Rush there was a significant increase in both early and late sprouting. None of the MH treatments significantly reduced root yields. [See also *Fld Crop Abstr.* 7 : 952.]—From author's summary.

270 Lana, E. P. and Peterson, L. E. **The effect of fertilizer-irrigation combinations on sweet potatoes in Buckner coarse sand.** *Proc. Amer. Soc. hort. Sci.* 1956, **68,** 400–5, bibl. 3, illus. [Iowa State Coll., Ames]

In experiments on *Ipomoea batatas* during 1952–4, irrigation rates consisted of 1-in. applications every 7 days and every 3-4 days, when rain did not supply these amounts. Fertilizer treatments were at 700, 1200 and 1700 lb./ac., derived from a 3 : 9 : 18 NPK ratio. Weekly irrigation gave yields equal to those from the more frequent rate and maintained the field water-capacity up to almost 50% of the available moisture. The greatest yields of No. 1 grade roots and total yields resulted at the higher rates of N and K application.—From authors' summary.

271 Lewis, D. A and Morris, L. L. **Effects of chilling storage on respiration and deterioration of several sweet potato varieties.** *Proc. Amer. Soc. hort. Sci.* 1956, **83,** 421–8, bibl. 14, illus. [Univ. California, Davis]

Eleven varieties of *Ipomoea batatas* were stored at 59 and 50°F. and Porto Rico also at 41°F. Chilling injury developed on all varieties at 50°F. and was severe on Porto Rico at 41°F. Chilling injury was expressed as accelerated respiration, increased decay, surface pitting and shriveling, inhibition and death of sprouts, taste differences and in some varieties, flesh discolouration after cutting.—From authors' summary.

272 Anderson, W. S. **Some effects of curing and storage on the weight and carotene content of certain sweetpotato varieties.** *Proc. Amer. Soc. hort. Sci.* 1956, **68,** 412–16, bibl. 3. [Mississippi Agric. Exp. Sta.]

273 Jenkins, W. F. and Anderson, W. S. **Geographical location and storage affecting carbohydrates and canning quality in sweetpotatoes.** *Proc. Amer. Soc. hort. Sci.* 1956, **68,** 406–11, bibl. 11. [Mississippi Agric. Exp. Sta.]

YAMS

274 Girard, Françoise and Barrau, J. Quelques plantes alimentaires et rituelles en usage chez les Buang, District de Morobé, Nouvelle Guinée sous tutelle australienne. [**Some food and ritual plants used by the Buang, Morobé District, New Guinea under Australian administration.**] *J. Agric. trop. et Bot. appl.* 1957, **4,** No. 5–6, 212–27, illus.

The staple food crops are yam and sweet-potato. Maize, introduced by the Australians, is also important. Annotated lists are given of the local varieties of yam (*Dioscorea alata*) and sweet-potato (*Ipomoea batatas*).—E.B.O.

275 Barrau, J. Les Aracées à tubercules alimentaires des Iles du Pacifique Sud. [**The South Pacific Islands Araceae with nutritive tubers.**] *J. Agric. trop. et Bot. appl.* 1957, **4,** No. 1–2, 34–52, bibl. 35, illus. [S. Pacific Comm.]

Information, including synonyms, description, and vernacular names, is given on *Cyrtosperma chamissonis, Amorphophallus campanulatus, Alocasia macrorrhiza, Colocasia antiquorum, C. esculenta, Xanthosoma sagittifolium, X. violaceum* and *X. brasiliense*. The taxonomy of these species is discussed. [See also *Fld Crop Abstr.* 10 : 649.]—E.B.O.

GENERAL

276 British Weed Control Conference. **Proceedings of the 3rd Meeting, 1956.** 1957, Vol. 1, pp. 431 ; Vol. 2, pp. 433–870. [For other papers see Abs. 168, 194, 219, 362.]

Papers presented included :

1. Application of pentachlorophenol emulsions for pre-emergence weed control. By J. L. Hunt, pp. 655–61, bibl. 4. The use of PCP for the control of weeds in sugar-beet, mangels, fodder-beet, beans, peas, potatoes and kale is discussed.
2. Pre-emergence weed control in row crops, and the importance of rainfall. By K. A. Hassall and C. A. Jewell, pp. 663–71, bibl. 8. The amount of rain falling within 3–6 weeks of spraying markedly affected the toxicity of monuron to both weeds and crops (sugar-beet and kale). The damage done to both was greater under wet than under dry conditions.
3. The control of wild oats with TCA, propham (IPC) and related compounds. By Helen M. Holmes and R. K. Pfeiffer, pp. 79–93, bibl. 3. TCA at 7·5 lb./ac. applied before sowing the sugar-beet, kale or peas, gave 75% control of *Avena* spp. but is recommended for use in peas only

where weed infestation is heavy. Propham at 4–6 lb./ac., applied before sowing, gave 50–65% control of wild oats.

4. The control of weeds in kale by spraying with sulphuric acid. Interim report of field experiments. By W. Q. Connold and others, pp. 767–9, bibl. 1. —M.P.

FIBRE CROPS

COTTON

277 Appa Rao, P. **The future cotton problems of Tungabhadra Project area [Hyderabad].** *Indian Cott. Gr. Rev.* 1957, **11**, No. 3, 320–8, bibl. 20. [Agric. Res. Sta., Sirugguppa]

278 Kalyanaraman, S. M. and Rangaswami, T. V. **Recent trials on the introduction of cotton in rice fallows in Madras State.** *Indian Cott. Gr. Rev.* 1957, **11**, No. 3, 285–308, bibl. 8. [Agric. Coll. and Res. Inst., Coimbatore]

The trials included studies on spacing and on varieties and on the residual effect of cotton on the succeeding rice crop. A spacing of 1·5 ft. between rows and 4·5 in. along rows gave a 36% higher yield than that obtained from a spacing of 2 ft. × 6 in. The varieties recommended are : Coker for Aduthurai, P. 216F for Coimbatore and P.23F for Palur. Manuring of the cotton crop with at least 40 lb. N per ac. (as $(NH_4)_2SO_4$/ha.) was essential.—D.B.

279 Lombard, P. Bilan de quatre années d'essais d'irrigation et de fumure minérale en culture cotonnière. [**Results from 4-years' trials of irrigation and chemical manuring of cotton.**] *Terre maroc.* 1957, **31**, No. 332, 201–3. [Sta. Rech. Cot., Tadla, Morocco]

Results from trials in 1951–2 indicated that the optimal frequency of irrigation treatments, each supplying 700 cu. m. of water per ha., is 10 days. Results from trials in 1954–5 showed that it is possible to economize on irrigation water from sowing to flowering, the interval of 21 days being adequate during this period (during April–May it can be extended to 1 month) ; but from end-June to end-August, with irrigation treatments each supplying 650 cu. m./ha., the interval should not exceed 10 days.—E.B.O.

280 Tarr, S. A. J. **End-of-season destruction of cotton plants in the Sudan Gezira.** *Emp. J. exp. Agric.* 1957, **25**, No. 99, 185–96, bibl. 4. [Res. Div., Minist. Agric., Republ. Sudan]

The various factors affecting regrowth (ratoons) of cotton plants in the Sudan Gezira following end-of-season cutting at soil level in April–May are described. Magnitude and distribution of rainfall were important. Cutting in late May and June resulted in later regrowth than cutting in April and early May. Cutting the tap roots 6 in. below soil level greatly reduced and delayed subsequent regrowth of the remaining stumps. The most effective chemical control method was by immediate wetting of cut stumps with a 5% 2,4-D amine solution in water, using 0·5–1 cc. per stump (2·2–4·4 gal./ac.).—From author's summary.

281 Hatipova, H. M. **The causes of thinning in cotton stands grown on lucerne sod.** [Russian] *Počvovedenie* (*Pedology, Moscow*) 1957, No. 5, 91–6, bibl. 8, illus., English summary.

The author's experiments showed that the thinning of cotton stands on lucerne sod under Azerbaïdžan conditions is caused by great amounts of half-decayed or undecayed vegetable residues in the soil at the time of sowing. Winter watering, after the sod is upturned, stimulates the development of microflora and consequently stimulates the decomposition of the main mass of crop residues at the time of cotton sowing. Increasing the compactness of the seed-bed and applying superphosphate at sowing are measures recommended to obviate thinning in cotton stands.—From author's summary.

282 Jones, D. L. and others. **Cotton production on the Texas High Plains.** *Bull. 830 Texas Agric. Exp. Sta.* 1956, pp. 15, illus.

Practical recommendations are made for cotton production under dry-land and irrigated conditions in the High Plains region of Texas. Data are given showing the relation between cotton emergence and soil temperature, sowing rates and yields and between seedling emergence and depth of sowing.—P.J.B.

283 Rodríguez, J. P. and Martorell, L. F. El cultivo del algodón en Puerto Rico. [**Cotton-growing in Puerto Rico.**] *Bull. 131 Esta. exp. agric. Río Piedras, Puerto Rico* 1956, pp. 102, bibl. 39, illus., English summary.

Although in Puerto Rico the climate is ideal for cotton and there are many soils suitable for this crop, the area under cotton is small. With a view to developing cotton-growing, general information is given on the crop, including its history, botany and cultivation. As a result of experiments at the Río Piedras Station, Montserrat and Sea Island cotton varieties are recommended.—E.B.O.

284 Beingolea, G. O. El sembrío del maíz y la fauna benéfica del algodonero. [**The sowing of maize and the fauna beneficial to cotton.**] *Inf. 104 La Molina Esta. exp. agric.* 1957, pp. 19, bibl. 10, English summary.

Growing maize near or in cotton fields had a favourable influence on the building up of a fauna beneficial to cotton.—From author's summary.

285 Ventura, M. M. Absorção de água,

equilíbrios higroscópicos e atividade respiratória em sementes de algodão "Mocó" (*Gossypium hirsutum* L. var. Maria Galante Hutch.). [**Water absorption, hygroscopic equilibria and respiratory activity in seeds of "Mocó" cotton (*G. hirsutum* var. Marie Galante).**] *Phyton* 1956, **7**, No. 1, 7–13, bibl. 3, English abstract. [Dep. Quím. Agríc., Esc. Agron. do Ceará, Fortaleza, Ceará, Brazil]

The penetration of water into cotton seeds was studied by immersing them in solutions of sodium chloride giving different osmotic pressures. A table shows the percentage increases in weight after 3–24 hr. The penetration of water into the seed was found to take place initially almost exclusively through the chalaza. The effect of the relative humidity of a static atmosphere (15–95%) on the moisture absorption of intact seeds was investigated ; equilibrium was reached after 20–25 days. When seed respiration was measured as a function of their moisture content, the plotted data gave an exponential curve.—E.B.O.

286 Toms, A. M. **Weed control in the Sudan Gezira, with particular reference to the use of the substituted urea group of weed-killers.** *Emp. Cott. Gr. Rev.* 1957, **34,** No. 4, 280–7, bibl. 6, illus. [Sudan Gezira Board, Barakat, Republ. Sudan]

Best control of *Cyperus rotundus* was obtained by mechanical cultivation, which also controlled *Cynodon dactylon.* Diuron, at 0·5–1 lb./feddan [1 feddan = 1·038 ac.], showed promise in checking these 2 weeds, other annual grasses and dicotyledons, and had a residual action in the year after application. It was of particular value for the control of *Cyanotis axillaris* a weed recently introduced into the Sudan. Other substituted urea herbicides tested proved uneconomical, and toxic to cotton at the high rates required. It was shown that the apparent tolerance of cotton to substituted urea herbicides, used as pre-emergence sprays, was an effect of seed placement and mode of growth in relation to herbicide application.—M.P.

287 Kandaswamy, M. and Venkata Rao, A. **A note on the control of 'seedling blight' of cotton.** *Madras agric. J.* 1957, **14,** No. 4, 154–5, bibl. 1. [Agric. Res. Inst., Coimbatore, India]

Ceresan (wet) or leytosol at 0·1% concentration are recommended as soil fungicides for the control of *Pellicularia filamentosa.*—M.P.

288 Gadkari, P. D. and Saini, A. D. **Observations on the stomata frequency in Indian cottons.** *Indian Cott. Gr. Rev.* 1957, **11,** No. 1, 16–37, bibl. 8, illus. [Inst. Pl. Industry, Indore]

Studies on the stomata frequency per unit area of leaf surface were carried out with 20 Indian cotton varieties. *Gossypium hirsutum* had significantly less density per sq. mm. than either *G. arboreum* or *G. herbaceum.* Stomata density on the leaf lamina increased with the distance the point of leaf insertion was removed from the soil. Stomata frequency/unit area was correlated with the internodal length of the plant.—From authors' summary.

289 Slatyer, R. O. **The influence of progressive increases in total soil moisture stress on transpiration, growth, and internal water relationships of plants.** *Aust. J. biol. Sci.* 1957, **10,** No. 3, 320–35, bibl. 57, illus. [Div. Ld Res., Reg. Surv., C.S.I.R.O., Canberra]

The response of cotton (*Gossypium barbadense*) to conditions of increasing total soil-moisture stress were measured in terms of vegetative growth, stem elongation, transpiration, leaf turgor, diffusion pressure deficit and osmotic pressure. The response pattern showed a close relationship to water stress, and in each species growth (as total dry weight) did not continue beyond a stress value such that there was zero turgor pressure in the tissue of adult leaves. Stem elongation also ceased at this value. Permanent wilting was also associated with the point of zero turgor pressure and occurred at a soil-water content of 10·2%, equivalent to a total soil-moisture stress value of 48 atm.—From author's summary.

290 Filippov, L. A. **Concentration of cell sap in cotton leaves in relation to age and water supply of the leaves.** [Russian] *Fiziol. Rast.* (*Pl. Physiol. USSR*) 1956, **3,** No. 6, 393–8, bibl. 4, English summary.

The concentration of cell sap in cotton leaves between the period of flower initiation and [flower] maturation was determined by the refractometer technique. An increase (between 1 and 2 p.m.) of cell sap concentration by 13–14% in cotton leaves occupying the fourth tier with respect to the growing point is a physiological index of the approach of water deficiency and of the necessity for watering.—From author's summary.

291 Eaton, F. M. and Ergle, D. R. **Mineral nutrition of the cotton plant.** *Pl. Physiol.* 1957, **32,** No. 3, 169–75, bibl. 23, illus. [Texas Agric. Exp. Sta.]

The growth and mineral accumulation of cotton plants in a warm-to-hot summer greenhouse were measured at 5-day intervals for 30 days from sowing. Within 5 days there was no dry-weight change, but large accumulations of N, K, Ca and Na and a loss of P had occurred. The P-concentration declined until the 15th day and then began to rise. Between the 10th and

30th day, the weights of the plant and of the several elements tended to double at 5-day intervals. During boll development there were large increments in dry matter and in total N, P, K, Ca and Mg. These increments passed to the buds and bolls, whereas the dry-matter and mineral contents of the vegetative tissues remained fairly constant, as did the stem-carbohydrate content. This constancy of concentration explains the production of uniform fibres over a prolonged period of boll development. The plant discards superfluous bolls when they exceed 6–7 per 100 g. of fresh leaves and stems and this is ascribed to an anti-auxin substance which curtails vegetative expansion and induces abscission.—From authors' summary.

292 Dahnovič, T. **[Effect of soil salinity on change in some cotton features.]** [Russian] *Hlopkovodstvo* (*Cott. Prod.*) 1957, **7**, No. 6, 29–33, illus. [All-Union Inst. Plant Industry]

The study was carried out on the Tašauz Experiment Station, located in Turkmenia on newly reclaimed land of the Amu-Darya Delta. The soil is a takyr type of grey earth, characterized by the presence of sulphate and chlorine salts, the concentration of which fluctuates between 0·02 to 0·1% in irrigated areas and between 1 to 2% in unirrigated land. The cotton seed samples were obtained from the All-Union Institute of Plant Industry, Central Asiatic Station at Taškent. The primary objective was to evaluate forms of the cotton plant as a basis for selecting material suitable for northern Turkmenia. In the first year attention was given to specimens in which certain morphological characters of agricultural value differed from those in plants grown at Taškent. Under the conditions of Tašauz the cotton plant is more stunted, has a smaller leaf surface, short fertile branches and smaller bolls. These undesirable features are attributed to soil salinity. Information is given on (1) the chemical composition of leaves of cotton varieties (VIR, 1306, and 108F) when grown under normal and saline soils ; and (2) comparison of the chemical composition of cotton leaves when the plants are grown near Taškent and in northern Turkmenia. There is evidence that saline soils have an adverse effect on the crops' nutrient regime, and that the plant becomes adapted to soil salinity by processes which include the development of succulence and the capacity to increase the water content of water-holding tissues. It is maintained that the plasticity of the cotton crop facilitates the selection of types adapted to saline areas.—M.H.

293 Joham, H. E. **Carbohydrate distribution as affected by calcium deficiency in cotton.** *Pl. Physiol.* 1957 **32**, No. 2, 113–17, bibl. 14, illus. [Texas Agric. Exp. Sta., College Sta.]

The influence of Ca-deficiency on height, dry weight, flower number, boll weight, flowering and earliness of flowering in cotton was studied, using sand cultures. An inverse relationship was found between leaf-carbohydrate content and Ca-availability, whereas carbohydrate contents of stems and roots tended to be directly dependent on substrate Ca.—From author's summary.

294 Olsen, R. A. **Absorption of sulfur dioxide from the atmosphere by cotton plants.** *Soil Sci.* 1957, **84**, No. 2, 107–11, bibl. 11, illus. [Soil and Water Conserv. Res. Div., U.S. Dep. Agric., Beltsville, Maryland]

Cotton seedlings were grown in nutrient solutions containing 0·1, 2, 5, 10 and 50 ppm. sulphate as sodium sulphate. Concentrations of 0·1 ppm. caused chlorosis and very little growth was made. Increments up to 10 ppm. sulphate resulted in marked increases in growth and reductions in chlorosis. Plants grown in 10-ppm. concentrations grew rapidly and were dark green; higher concentrations of sulphate did not result in increased growth. Atmospheric SO_2 (ranging from 0·01 to 0·05 ppm. by volume) was readily absorbed by the plants, the amount absorbed being roughly proportional to the leaf area. Healthy plants obtained about 30% of their total S from the atmosphere ; in chlorotic plants, about 50% of their S came from the air. The presence of SO_2 in the air used to aerate the nutrient solutions in which the plants grew did not affect their growth or S content.—P.J.B.

295 Logan, C. and Coaker, T. H. **The use of polythene for growing cotton plants under greenhouse conditions.** *Emp. Cott. Gr. Rev.* 1957, **34**, No. 3, 189–90, bibl. 1, illus. [E.C.G.C., Namulonge, Uganda]

An 18-in. length of natural coloured polythene tubing, of 500-gauge thickness and 15 in. wide, is heat-sealed to form a bag. To permit sub-irrigation, twelve 0·25 in.-diam. holes are punched along the sealed end. Each bag is then filled to within 1 in. of the top with a 40 : 1 mixture of top soil and cow dung, passed through a 25 mesh/sq. in. sieve. The filled bags are then placed in greenhouse troughs, the seed sown and the troughs filled with water to a depth of 2-3 in. The soil/cow dung medium requires 4–5 days to become completely wetted by sub-irrigation. Germination occurs within 48 hr. of complete wetting, the 1st flowers appear *c.* 50 days after germination and the interval between flowering and boll-split is usually 55 days. By this method, uniform and vigorous cotton plants, supporting some 30–40 bolls to full maturation, are obtainable. No symptoms of waterlogging were shown in trials, even after continuous sub-irrigation.—M.P.

296 Singh, Sardar. **Effect of organic manures and superphosphate singly and**

in combination on cotton and their residual effect on jowar (*Sorghum vulgare*). *Indian J. Agron.* 1957, **1**, No. 3, 177–90, bibl. 12. [Inst. Pl. Ind., Indore]

297 RAMASWAMY, V. and BHATT, M. V. **Manurial trials with Sea Island cotton in the West Coast of Madras State.** *Indian Cott. Gr. Rev.* 1957, **11**, No. 2, 141–7, bibl. 5.

Yields of 220 and 413 lb. seed cotton per acre, respectively, from the Sea Island varieties St. Vincent and Montserrat were uneconomic owing to the high cost of cultivation. In manurial trials, economic yields of 645 lb. per acre were obtained by using 3 tons FYM, 500 lb. lime, 50 lb. K (as K_2SO_4), 30 lb. P (as superphosphate) and a top dressing of 60 lb. N (preferably as $(NH_4)_2SO_4$) in 2 split applications. This manuring also improved fibre length.—D.B.

298 INSTITUT DE RECHERCHES DU COTON ET DES TEXTILES EXOTIQUES. Activité de l'IRCT 1955. [**The work of the IRCT during 1955.**] *Cot. et Fibr. trop.* 1957, **12**, No. 1, 1–171, illus.

Cotton investigations reported :

1. French Equatorial Africa. Bambari Station, Ubangi-Shari, pp. 9–23. Varieties. In the northern region, varieties of the Allen type, mainly Allen 150, are best. In the central region, the principal variety grown is Banda 2 ; in regional trials, Allen 150 was inferior to K-9, which will be multiplied. In M'Bomou, B-1439 (Fusarium-resistant) which yielded about 850 kg. of seed-cotton per ha. in 1955–6, is being multiplied. For seed disinfection, granopera has been found the most effective preparation. Treatment of whole seeds with 0·5% granopera increased yields, on average, by 10% during 5 years in 11 trials. Results from another trial indicated that granopera is more effective on delinted seeds than on whole seeds. Bossangoa Station, pp. 24–30. Results from 5 trials in different localities, in which cotton was sown on 5 and 20 June, 5 and 20 July and 5 August, showed an advantage from sowing early. Tikem Station, Chad, pp. 31–8. The variety 58-151, multiplied at the Station, yielded an average of 1400 kg. of seed-cotton per ha., its ginning return being 37%. The multiplication of the varieties A 49 T, A 50 T and 58–151 continued on native farms. In 1959, the whole cotton area of the Chad will be sown with A 150 and 58-151. From manurial trials it was concluded that : (a) the best time for applying chemical fertilizers and crushed cotton-seed is immediately after thinning ; (b) the application of 20 metric tons of farm-yard manure per ha. increases yields by 15–20% ; (c) the application of 100 kg. of ammonium sulphate per ha. increases yields by 10–15% over that of the unmanured controls. An insecticidal treatment against *Heliothis* sp. applied from 26 Oct. on the whole area, and another against *Diparopsis* sp. applied during 20–24 Nov. on part of the area, were satisfactory, the increases in yield being 20–200 kg./ha. over those from untreated plots. Bebedjia Station, pp. 39–51. In comparative trials, the variety A 150 was superior to Allen common type by 14% in gross yield and by 8% in ginning return, i.e. over 40% more fibre than Allen ; the variety 150 K gave the highest yield, which was 6·5% higher than that of A 150. In manurial trials, 600 kg. of crushed cotton-seed per ha. increased yields by about 10%, and 1000 kg./ha. by about 20% ; 100 kg. of ammonium sulphate per ha. gave an average increase in yield of 100 kg. of seed-cotton per ha.

2. French West Africa. Bouaké Station (Ivory Coast), pp. 52–62. In varietal trials, Mono 55, jassid-resistant, yielded best both with and without insecticidal treatment (925 kg. and 664 kg. of seed-cotton per ha., respectively), and was followed by Mono 54 and Mono 53. M'Pesoba-Koutiala Station (French Sudan), pp. 63–73. The varieties multiplied at the Station were Az 58–333–154 and Az 58–151. In varietal trials in bush land in different localities, A 150 and Az 58–151 yielded best. Anié-Mono Station (Togoland), pp. 74–7. The varieties multiplied were Anié 55 and Mono 55.

3. North Africa. Morocco, Tadla Station, pp. 78–98. In a varietal trial, Ashmouni yielded best with 456 kg. of lint per ha., followed by Giza 31, Menoufi and Pima 67 M 153. Giza 31 was earliest with 74·5% of cotton harvested on 31 Aug., followed by Menoufi, Ashmouni and Pima 32. An account is given of a study on flowering and boll formation, and of irrigation-, manurial- and crop-rotation-trials. Algeria. Textile Section of Perregaux, pp. 99–109. In varietal trials in 3 localities, Dendera yielded best with 800 kg. of lint per ha. (average of 2 years). At Ferme Blanche, a density of 200,000 plants per ha. gave the highest yield, while at Hamadena where the soil is saline, a density of 133,000 was best. In the heavy soils of the region, which has cold spring weather, the percentage of pockets having less than 2 germinated seeds was 7 where 10, or 15, seeds were sown per pocket, and 13 where 5 seeds were sown. At Hamadena the yield of cotton sown after 10–15 May is about one-third that of cotton sown at the beginning of April.

4. Madagascar, Tuléar Province, pp. 112–21. Irrigated cultivation. In a varietal trial, Stoneville yielded best with 1710 kg./ha. In a plant-density trial using the variety Acala 4–42, yields increased with increasing densities (15,000–60,000 plants/ha.). Majunga Province, pp. 121–2. In trials in the high alluvial soils of Mourafeno in the wet season, the highest yielding variety was Stoneville (1112 kg./ha.), which was also the shortest.—E.B.O.

299 Empire Cotton Growing Corporation. **Progress reports from experiment stations, season 1955-56. West Indies.** London, 1957, pp. 15.

1. Acid treatment of seed, pp. 5–6. Early growth was better and seed-cotton yields were greater from plots in which the seed had been treated with H_2SO_4 than from plots sown with untreated seed.

2. Plant spacing and population studies, pp. 6–7. The variety VH8 was grown. Seed-cotton yields were similar on all soils from plant densities of 10,890 or 21,780 plants/ac., but on a shallow soil, significantly higher yields were obtained when the stand was thinned to 1 plant per hole, compared with 2 plants per hole, particularly at the lower population density.

3. Land-use trial, pp. 8–9. Cotton following 3 years of sugar-cane, elephant grass or continuous cotton with a close-season green manure yielded, on average, 19, 6 and 21%, respectively, more than continuous cotton under a close-season weed-fallow.—M.P.

FLAX

300 Frederiksen, P. S. Aktuella linproblem. Danmark. [**Current flax problems. Denmark.**] *Lin* 1957, **11**, No. 3, 23.

Results of experiments since the war have shown barley and oats [after grass] to be the best preceding crops for high-quality fibre-flax production. From 1945–55, the area under flax preceded by clover/grass was reduced from 65 to 5% while the area preceded by barley was increased from 5 to 50% of the total area. The most suitable preceding crops for high-quality fibre production were : barley, oats, grass [for seed production] and roots. Clover/grass, peas, and cruciferous crops should not be used. After a cruciferous crop, fibre-flax was very susceptible to attacks by *Thrips angusticeps*.—J.K.L.

301 Heidendahl, N. M. Aktuella linproblem. Förfrukt till spånadslin och hampa. [**Current flax problems. Preceding crops for fibre-flax and hemp.**] *Lin* 1957, **11**, No. 3, 21–2.

Flax. Experiments conducted during the past 10 years in Sweden have shown cereal crops to be better than clover/grass as a preceding crop for flax, especially when high quality fibre-flax production is of importance. Clover/grass as a preceding crop resulted in a higher yield of flax fibre/ha. but the quality was rather coarse and uneven. In Sweden, there has been a greater risk of attack by *Tipula paludosa* on flax preceded by clover/grass than after a cereal crop. For high-quality flax production, 2 crop-rotations are suggested : (1) sugar-beet, cereals, flax, winter cereals or oil crops, oats or spring wheat ; and (2) grass, cereals, flax, winter wheat or oil-crops, roots, cereals. The experiments further showed the importance of providing a firm but fine seed-bed for the flax crop.

Hemp. In Sweden, hemp is grown mainly on moorland soils in the island of Gotland. Clover/grass was found to be the best preceding crop. The best crop rotation for hemp-growing on these soils was : clover/grass 3–4 yr., hemp 1–2 yr., root crops 1 yr. and cereals 1–2 yr. Leys should not be more than 4–5 yr. old, at the most. Attacks of wireworm (*Agriotes* spp.) were experienced, particularly in 1-year's hemp, but dressing of seed with aldrogén gave good control. Best results from manuring were obtained by applying (kg./ha.) 400–500 superphosphate, 300–350 muriate of potash and 0–200 sulphate of ammonia.—J.K.L.

302 Pontoppidan, H. Forsøg med spindhørudsæd af forskellig oprindelse. [**Trials with fibre-flax seed of different origin.**] *Lin* 1957, **11**, No. 3, 14–18, illus., English summary. [Taastrup Flax Scutching Sta., Denmark]

In 11 field trials during 1954–6, fibre-flax seed of Danish origin [Taastrup] was compared with seed of Dutch origin using Concurrent in 2 trials, and the new variety Wiera in 9. On an average, seed of Dutch origin yielded [in kg./ha.] : scutched flax 991, tow 380 and seed 1276. The Danish standard variety yielded correspondingly, 946, 354 and 1260.—J.K.L.

303 Larsen, A. and Bagge, H. Forsøg med raekkeafstand og såmaengde i spindhør. [**Experiments on row spacing and seed rates in fibre flax.**] *Ber. 540 Stat. Forsvøgsirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1957, **61**, No. 2, 241–76, bibl. 6, illus., English summary.

This report covers 16 experiments conducted at 2 locations on light clay on a sandy subsoil and at 2 locations on heavier clay on a clay subsoil. Liral Sussex was used in the first 2 yr. and Wiera in the last 2 yr. of the trials. The seed rates were 125, 150 and 175 kg. per ha. and the row-spacings 8 and 12 cm. On both types of soil the 8-cm. spacing gave greater straw-length and a higher yield of long-fibres than the 12-cm. spacing. On the light clay the best seed rate was 175 kg. per ha., giving about 2,400 plants per sq. m. ; on the heavier clay the seed rate should be reduced to 150 kg. per ha. to obtain a density of about 2,000 plants per sq. m.—J.K.L.

304 Doucet, M. and others. Contribuţii la studiul çi raionarea soiurilor de in pentru fibre. [**The regional distribution of fibre-flax varieties.**] *Anal. Inst. Cerc. agron. Român.* 1956, **23**, 275–95, bibl. 4, illus., French and Russian summaries. [Inst. Agron. Res., Sîngeorgiu de Mures, Romania]

During 1951–4, Local de Sîngeorgiu, Concurrent and several Soviet flax varieties were

compared. Local de Sîngeorgiu gave the highest stem and fibre yields, but its fibre quality was inferior. The variety '1288' was equal to Concurrent in quality and superior in fibre yield (1214 and 1074 kg./ha., respectively.)—From authors' summary.

305 Frederiksen, P. S. Undersøgelser over vaeksten hos unge spindhørplanter saerligt med henblik på voksdannelsen på staengler og blade. [**Investigations on the growth of young fibre-flax plants with special reference to wax formation of stems and leaves.**] *Lin* 1957, **11**, No. 4, 33–5, bibl. 1, illus., English summary. [Dansk Hørforsk. Inst., Denmark]

Measurements were made on the growth of flax plants from 6 to 39 days after germination. Data are given of height, area of leaves + stems, dry-matter content and quantity of wax present. Dry-matter content was highest in the leaves and shoot apices of young plants. The region just below the apices of the plants had the lowest dry-matter content, a part of the plant where scorching can occur after exposure to strong spraying solutions. The wax layer was virtually absent in seedlings. The amount of wax per 1000 cm.^{2} rose to an average of 16·8 mg. at the 12th day after germination (plants 2·6 cm. tall), thereafter fell to 11·1 mg. by the 19th day after germination (4·1 cm. tall), before rising again to a maximum of 17·3 mg. at the 31st day after germination (13·3 cm. tall). The importance of wax-covering and of dry-matter content are discussed with regard to resistance against damage by spraying.—P.J.B.

HIBISCUS SPP.

306 Busson, F. and others. Composition en acides aminés des calices d'*Hibiscus sabdariffa* (Linn.). [**Amino-acid composition of the calyces of *Hibiscus sabdariffa*.**] *J. Agric. trop. et Bot. appl.* 1957, **4**, No. 5–6, 265–6, bibl. 4.

307 Institut de Recherches du Coton et des Textiles Exotiques. Activité de l'IRCT 1955. [**The work of IRCT during 1955.**] *Cot. et Fibr. trop.* 1957, **12**, No. 1, 1–171, illus.

1. French Equatorial Africa. Madingou Station, Middle Congo, pp. 125–39. *Urena lobata.* Three late, high-yielding populations were multiplied: L.M., B.L. and B.G. which averaged 2390, 2325 and 2920 kg. of fibre per ha., respectively. A study of bacteriological retting is in progress. *Hibiscus cannabinus.* The late variety Viridis yielded 2400 kg. of fibre per ha.

2. North Africa. Morocco, Tadla Experimental Centre, p. 141. In a varietal trial with *Hibiscus* sp., Soudan, late, yielded best. Algeria, Perregaux Textile Section, pp. 142. Promising results were obtained from the first year's growing of *H. cannabinus* on saline soil at the Hamadena Centre.—E.B.O.

OIL CROPS

SESAME

308 Mazzani, B. El ajonjolí. Normas práctica para su cultivo. El ajonjolí en Venezuela [**Practical hints for growing sesame (*Sesamum indicum*) in Venezuela.**] *Agricultor venezo* 1956, **20**, No. 186 and 187, 34–7 and 36–7, illus.

309 Mazzani, B. and Cobo, Margarita. Efecto de diferentes distancias de siembra sobr algunos caracteres de variedades ramificadas d ajonjolí. [**Effect of different plant densitie on some characters of branched varieties o sesame.**] *Agron. trop., Maracay* 1956, **6**, No. 3–14, bibl. 2.

The branched sesame varieties Inamar an Morada were grown at 9 densities varying fro 36,630 to 200,000 plants per ha. It was found tha seed yield, oil percentage, number of branche plant height and height of the first fruits on th plant varied little with the different densities. I both varieties the highest yields were obtaine with the highest densities.—E.B.O.

310 Tahir, W. M. **Notes on sesame varieties, 1956.** *Publ. Minist. Agric. Repub Sudan* [n.d.], pp. 8. [Tozi Res. Fm, Repub Sudan] [Received July, 1957]

The agronomic characteristics of 28 intro duced and 54 indigenous sesame varieties studie during 1956 are presented.—M.P.

311 Mazzani, B. and Horovitz, S. Clave par el reconocimiento de las variedades d ajonjolí cultivadas en Venezuela. [**A key for th identification of the sesame varieties grow in Venezuela.**] *Agron. trop., Maracay* 1955, 5 No. 1, 45–9, bibl. 6. [Received March, 1957]

A key, in which morphological characters ar considered, is given for identifying the followin varieties: vegetative period up to 90 days Venezuela 51, Acarigua, Aceitera; 95–110 days Inamar, Morada; more than 110 days, Venezuel 52, Criollo and Indehiscente.—E.B.O.

312 Mazzani, B. "Aceitera", una nuev variedad de ajonjolí producida en el Centr de Investigaciones Agronómicas. [**Aceitera, new sesame variety from the Centre for Agronomic Research (Maracay, Venezuela).**] *Agron. trop., Maracay* 1955, **5**, No. 1, 37–44, bibl. illus., English summary. [Received March, 1957

A description and the characteristics o Aceitera are given. The oil content of the 3 strains from which this variety originated, are 58·9, 59· and 60·3% (on dry basis), and their average yield 800, 821, 837 kg. of seed/ha., respectively.—E.B.O

SAFFLOWER

313 Argikar, G. P. and others. **The range of variation and correlation of some quantitative characters in *Carthamus tinctorius* L.** *Indian Oilseeds J.* 1957, **1**, No. 4, 228–34, bibl. 4. [Agric. Res. Sta., Bijapur, Bombay Province]

From the records of 15 quantitative characters for each of 26 varieties of safflower (*C. tinctorius*) those characters highly correlated with oil yield were : growth of stem, spread of plant, total number of fruiting branches, and total number of capitula per plant. Other characters which are correlated with oil yield, though less highly, are : plant height, maximum leaf length and maximum width of leaf. The flower colour and presence or absence of spines were also recorded. Some of the highest-yielding varieties were of the spiny type and had yellow flowers.—D.B.

314 Mazzani, B. Introducción de plantas oleaginosas nuevas para Venezuela. 4. *Carthamus tinctorius*. [**Introduction of oil plants new to Venezuela. 4. *C. tinctorius*.**] *Agron. trop., Maracay* 1955, **5**, No. 2, 105–10, bibl. 1, illus., English summary. [Cent. Invest. Agron., Maracay, Venezuela] [Received March, 1957]

A description and the characteristics are given of safflower (*C. tinctorius*) grown on experimental plots at Maracay and Araure. A selection was made of a giant thornless type the seed of which has an oil content of 62%.—E.B.O.

315 Keyser, H. R. and Williams, J. H. **Pre-emergence herbicides on safflower.** [Abstract] *Res. Rep. 12th N. Cent. Weed Contr. Conf.* 1955, 149. [Nebraska] [Received April, 1957]

RAPE

316 Lefèvre, G. and Lefèvre, P. Observations sur l'absorption des éléments nutritifs par le colza d'hiver. [**Observations on nutrient absorption by winter colza.**] *Ann. Inst. nat. Rech. agron., Paris Ser. A. Ann. agron.* 1957, **8**, No. 1, 125–44, bibl. 7, English, German and Russian summaries. [Sta. Agron., Amiens, France]

The colza [*Brassica napus* var. *oleifera* subvar. *biennis*] varieties now grown in France are of German origin and differ considerably, in their growth and nutrient uptake, from the old varieties. This raises new problems in the manuring of this crop. The development (increase in dry matter per plant and per ha.) and the absorption of N, P and K of the colza variety Alsace were compared with those of old varieties (as shown in the literature). It was found that the application of N fertilizers to Alsace increased considerably the concentration of this element in the plant and about doubled the N uptake, while no similar changes were found with the other nutrients. P content on a dry-matter basis, and its removal by the crop, were the same with a crop of 40,000 plants per ha. receiving farmyard manure and with a crop of 250,000 plants per ha. receiving 120 kg. of P_2O_5 as basic slag. In this same case, the crop treated with 200 kg. of potash showed half the K uptake as that in 1890. Thus, present colza crops, of a dry-matter production comparable to that of old varieties, contain at harvest much higher concentrations of N, similar levels of P and considerably smaller amounts of K. These differences arise mainly at shooting and flowering when present crops have a considerable vegetative development. As the curves of nutrient uptake show marked modifications during this period, fertilizers should be applied at this time.—E.B.O.

317 Lindner, H. Arbeitswirtschaftliche Untersuchungen bei verschiedenen Rapserntever-fahren. [**An examination of the labour involved in different methods for harvesting rape.**] *Dtsch. landw.* 1957, **8**, No. 5, 222–4, illus. [Forschungsstelle für Landarbeit, Gundorf, E. Germany]

Of 3 methods investigated, (a) mow-cutting followed by mow-threshing was superior to (b) cutting and threshing with the combine and (c) binding, cocking and threshing ; yields were higher and labour costs were lower (figures are given). Rape proved to be an unsuitable crop for the combine owing to the ripening of the pods at different dates and the choking of the machine with the green straw. Threshing in the cock is too dependent on weather.—D.B.

MUSTARD

318 Negi, L. S. and Maini, N. S. **' B.S.G.'—a promising new strain of sarson (*Brassica campestris*) for the Punjab.** *Indian Oilseeds J.* 1957, **1**, No. 3, 142–4, illus.

A strain of [mustard] brown sarson, named ' B.S.G.', has been built up at the Oilseed Sub-station, Gurgaon, Punjab. In large-scale trials carried out at the Sub-station and on a cultivator's field, the new strain has given, on an average, 193 lb., or 33% more per acre than the ' local ' variety. It also contains 5·8% more oil and is very uniform in maturity and growth habit. Its maturity period is about the same as that of the local variety.—From authors' summary.

319 Das, K. and Sarma, A. K. **Varietal response of mustards to dates of sowing and levels of fertilization.** *J. sci. Res., Banaras* 1956, **6**, 2, 236–50, bibl. 19. [Coll. Exp. Farm, Banaras Hindu Univ., India]

In a field experiment in 1953–4, two varieties of mustard were sown on 24 October and 3 November 1953 at 3 levels of manuring. Early sowing was

found to give a yield almost 3 times greater than late sowing. Medium manuring nearly doubled yield over no manure but no great increase was found by any additional manuring. The variety RT-11 gave a higher yield of seed than AGH-A; this was due to the greater number of branches and pods per plant which it possessed.—J.K.L.

CRAMBE ABYSSINICA

320 Kučerov, E. V. and Kislinskiĭ, N. K. [*Crambe*—**a valuable oil crop.**] [Russian] *Zemledelie* (*Agriculture, USSR*) 1956, **4**, No. 10, 71–3.

Oil crops in the USSR are grown on 5 million ha., but yields do not meet all the country's requirements. In recent years, trials have been in progress with the annual *C. abyssinica*. It is claimed that the seed contains 53% oil and the iodine number fluctuates between 86 and 97 [compare *Fld Crop Abstr.* 9 : 205]. In the Voronež Province, the [annual] seed yield (5-year average) was 2770 kg./ha. An account is given of trials carried out on cultural measures suitable for *Crambe* in the Harjkov Province [50°N. lat., 37°E. long.] and in the Baškir ASSR [55°N. lat., 55°E. long.]. In Harjkov, the best sowing date is late April but in Baškir the highest yields are obtained by sowing in the first half of May. Autumn sowings in Baškir should take place about 21 Oct.—M.H.

GENERAL

321 Bagge, H. and Nordestgaard, A. Artsforsøg med olieplanter 1950–1955. [**Species trials with oil plants 1950-5.**] *Beretn. 531 Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl.* 1957, **60**, No. 4, 612–20.

In 16 trials at 4 locations *Camelina sativa*, *Crambe abyssinica*, *Sinapis alba* and *Linum usitatissimum* yielded 643, 619, 428 and 535 kg. of oil per ha., respectively, with oil contents of 36, 36, 26 and 38%, respectively. The corresponding iodine values were 155, 94, 105 and 190. Both *Camelina sativa* and *Crambe abyssinica* are high-yielding oil plants and less susceptible to attacks by pests and fungi than other cruciferous oil plants, e.g. summer rape. The trials showed the best harvesting time to be at the beginning of pod ripening.—J.K.L.

322 Rüther, H. Versuchsergebnisse über den Anbau von Ölfrüchten. [**Results of cultivation trials with oil crops.**] *Z. landw. Versuchs- u. Untersuchwes. Rostock* 1957, **2**, No. 4, 338–55, bibl. 4. [Lauchstädt]

The effects were studied of the preceding crop, rate- and time-of-sowing, row-spacing, cultivation treatments and varieties on the yield of winter- and summer-rape [*Brassica napus* var.], poppy, mustard [*Sinapis alba*], sunflower and *Camelina sativa*. Yields were greatest from winter-rape and were followed (in order of decreasing yield) by sunflower, *C. sativa*, poppy, mustard and summer-rape.—M.P.

323 Vidal, A. A. Características físicas y químicas de los aceites en distintos períodos de madurez de semillas de algunas especies vegetales. [**Physical and chemical characteristics of the oil at different stages of seed ripening in some plant species.**] *Rev. Fac. Agron., La Plata* 1956, **32**, No. 2, 159–71, bibl. 19, English conclusions.

Seeds of the following species were studied: *Brassica campestris*, *Linum usitatissimum*, *Carthamus tinctorius*, *Helianthus annuus*, *Sesamum indicum* and *Glycine soya*.—E.B.O.

LAND USE, SURVEYS AND MANAGEMENT

324† Gessat, R. La Sologne. Milieu, pratiques agricoles actuelles. [**Sologne (France). Environment and present agricultural practices.**] *Bull. tech. Inform.* 1957, No. 119, 255–75, illus.

325† Cusson, J. La Sologne. Son évolution, son avenir. [**Sologne (France). Its evolution and future.**] *Bull. tech. Inform.* 1957, No. 119, 277–88, illus.

326 Dion, H. G. La agricultura en el altiplano de Bolivia. [**Agriculture on the Bolivian Plateau.**] *Cuad. Fom. agropec. 4 FAO* 1954, pp. 52, bibl. 12, illus. [Received July, 1957]

Information is given on climate, agriculture, land tenure and soils. The most important crops (in order of decreasing importance) are : potatoes, barley and quinua (*Chenopodium quinoa*, staple food of the natives). Wheat is also grown to some extent. Rye-growing is in the experimental stage. —E.B.O.

327 Lister, J. H. Estudio sobre los mercados agrícolas en Guatemala y las posibilidades de un mejoramiento futuro. [**A study on agricultural markets in Guatemala and possibilities for future improvement.**] 1956, pp. 155, illus., maps, Guatemala Minist. Agric. [Internat. Coop. Administration]

This work, prepared on request by, and with the co-operation of, the Agricultural Division of the Working Mission of the USA in Guatemala, gives information on : number and size of farms ; crop areas ; total productions and yields per

unit areas of maize, wheat and cotton in Guatemala.—E.B.O.

328† Anderssen, K. B. **Agriculture in the Central Burnett.** *Qd agric. J.* 1957, **83,** No. 3, 159–70, No. 4, 224–32, illus.

A brief description is given of : the climate ; soils and vegetation ; native, sown and irrigated pastures ; fodder, grain and other crops, grown in the Central Burnett district of Queensland.—M.P.

329† Condon, R. W. and Stannard, M. E. **Erosion in western New South Wales. 4. Classification and survey of erosion.** *J. Soil Conserv. N.S.W.* 1957, **13,** No. 3, 76–82, bibl. 2.

Notes are given concerning the basis of classification, erosion classes, the mapping of erosion and the progress of the erosion survey in the area.—M.P.

330† Condon, R. W. **Field mapping for erosion survey.** *J. Soil Conserv. N.S.W.* 1957, **13,** No. 3, 93–5, bibl. 4, illus.

A field mapping-system is described and illustrated whereby the topography, soil, and vegetation (the 3 features which comprise a ' land class'), also the erosion in an area, are each denoted on one map by symbols.—M.P.

331† Basu, J. K. and others. **Land-use planning for the Nilgiris : 1. Soil conservation survey. 2. Classification of land utilization.** *J. Soil Wat. Conserv., India* 1956, **5,** No. 1, 25–43, bibl. 8, 5 maps.

332 Levy, S. **Agriculture and economic development in Indonesia.** *Econ. Bot.* 1957, **11,** No. 1, 3–39, bibl. 53, illus.

The importance of rice, maize, cassava, sweet-potato, groundnuts and soyabeans in the food-producing sector and of various plantation crops in the export sector of the economy is discussed. Data are presented on acreage and production.—J.F.C.

FARMING SYSTEMS AND PRACTICES

333 Brind, W. D. **Some recent work on depth of plowing.** *Soils and Ferts* 1957, **20,** No. 5, 241–5, bibl. 13.

This is a review of the subject.

334 Teipel, R. Der Einfluss einer tieferen Bodenbearbeitung auf Bodeneigenschaften und Ertrag. [**The influence of deeper soil cultivation on soil conditions and yield.**] *Z. landw. Versuchs- u. Untersuchwes. Rostock* 1956, **2,** No. 4, 261–81, bibl. 73, illus. [Landw. Chem. Inst., Univ. Jena]

Trials carried out during 1951–5 showed that in the majority of cases, deep cultivations significantly increased the yields of winter wheat, oats, green-maize, potatoes, fodder-beet and sugar-beet. Where increases occurred, the averages (no. of trials in brackets) for green-maize (1), cereals (4), potatoes (5), fodder-beet (3) and sugar-beet (12) were : 23, 11, 15, 20 and 18%, respectively.—M.P.

335 Sauberan, C. and Molina, J. S. La quema de los rastrojos. [**Stubble burning.**] *Rev. argent. Agron.* 1956, **23,** No. 4, 157–79, bibl. 41.

From this review on stubble burning, mainly cereals, it is concluded that the possible advantages of this practice are greatly offset by its disadvantages.—E.B.O.

336† Hänninen, P. Herneen ja virnan viljelymahdollisuuksista kaurakasvustoissa suomessa. Sadon suuruus ja eräät laatuominaisuudet. **Mixed cropping of peas and vetches with oats in Finland. Legume-seed yields and some seed characteristics.** *Valt. Maatalousk. Julk.* 1956, No. 153, pp. 131, bibl. 87, illus., English summary. [Dep. Plant Husb., Tikkurila, Finland]

The possibilities of growing peas and vetches in mixtures with oats have been examined on the basis of seed yields and certain seed characteristics (size, appearance and germination capacity). The information on yields was obtained from field experiments carried out from 1947 to 1950,covering 60 experiments in all ; peas were included in every experiment and vetches in 34. The growing of peas and vetches in mixtures with oats does not give good results in the usual legume areas because of the high acidity of arable land, a condition which gives oats a good chance of intensive competition, but north of the usual legume areas, or in similar conditions, such mixtures generally give good results. The ripening of peas and vetches when grown in mixtures with oats is considerably faster than when grown alone, because the competition between the plants in mixed stands decreases the nitrogen fixation of legumes and thus hastens the process of ripening. This advantage is important, because it makes possible the growing of peas and vetches hundreds of kilometers beyond the north of the present legume areas, and thus it will be an influential factor in adding to the production of peas and vetches in Finland.—From author's summary.

337 Pillai, M. R. and others. **Mixed cropping trials with ragi, cotton and groundnut.** *Madras agric. J.* 1957, **44,** No. 4,

131–9. [Cent. Sugarcane Res. Sta., Palur, India] In trials carried out during 1951–5, the yield of ragi [*Eleusine coracana*] was similar when grown alone or mixed with cotton. The beneficial effect of the legumes on the yields of the second crop was noticeable. Highest monetary returns were obtained from ragi + groundnut, followed by groundnut alone and cotton + ragi + groundnut. Cotton alone, and cotton + ragi gave the lowest value of produce per ac. and per unit of time.—M.P.

338 Baars, C. Verslag van de beregeningsproeven in Noord-Brabant over 1955. [**Report for 1955 on the irrigation trials in North Brabant.**] *Gesten. Meded. 5 Cent. Inst. Landbouwk. Onderz., Wageningen* 1956, pp. 38.

Experiments in progress since 1953 tested the effects of sprinkler irrigation on field crops grown on 3 types of sandy soil : (1) reclaimed land having a high water-table and little susceptible to drought ; (2) old arable land with a low water-table, moderately susceptible to drought ; and (3) reclaimed land having low water-table, very susceptible to drought. Grain yield from the irrigated plots was approximately the same on (1) and (3). On (3) a satisfactory increase was obtained in the yield of summer barley, oats, peas and maize ; on (2) the yield of grain and peas was higher than on the reclaimed lands, but here irrigation in 1955 had a negative effect because the irrigated crop lodged earlier. On (3) a higher 1000-grain weight was obtained with summer barley and maize through irrigation. The yields of irrigated potatoes and beet were very high and approximately equal on (2) and (3) : they were rather lower on (1) but still very good. In general, dry-matter content fell as a result of irrigation, but on (3) in 1955 the contrary took place in beet and potatoes, for, during the dry weather of July and August, growth ceased in the untreated plots, to be renewed during heavy rain at end-August and early September, when fresh leaves were formed at the expense of dry-matter content. In (2) it was in potatoes, beet and peas only that moderately good results were obtained by irrigation, the lack of effect being due to the greater moisture resources of the soil and the higher rainfall of 1955. In spite of the dry June-August period, the amount of supplementary water required was not great : on the most drought-susceptible land it amounted, in mm. per ha., to 115 for beet and potatoes ; 118 for oats ; summer barley, 90 ; peas, 80 ; maize, 50 ; rye, 40. Rooting was more or less reduced in all the irrigated plots except in the case of beet (fodder- and sugar-), where the contrary was observed.—G.M.R.

339 Heick, F. and Sandfær, J. Fastliggende forsøg med vanding og gødskning. [**Experiments on irrigation and manuring 1950–5.**] *Beretn. 532 Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1957, **60**, No. 4, 621–56, English summary. [St. Jyndevad Agric. Res. Sta., Denmark]

During 1950–5 combined irrigation and manurial trials were carried out on light sandy soil with poor water-holding capacity in a 6-course rotation of : oats, rye, swedes, barley undersown with clover/grass and 2 yr. clover/grass. The trials had an irrigated and a non-irrigated section in the 4 manured sections which were: N,P and K; N and K ; N and P ; P and K. Irrigation gave the greatest increase in yield in the plots which had received N, P and K. The yield increases following irrigation (6-yr. averages of fully-manured plots) were : oats 11·4 hkg. grain and 9 hkg. straw/ha. ; rye 5·8 hkg. grain and 8·2 hkg. straw/ha ; barley (undersown) 7·6 hkg. grain and 7·8 hkg. straw/ha. In swedes, irrigation raised root-yield by 2·1 hkg. dry-matter/ha. and the yield of tops by 0·9 hkg., above the control. The greater response to irrigation in oats compared with barley and rye was partly due to the much better clover stand in the preceding irrigated clover/grass. The very low average-increase in yield of swedes covers great variations ; in 1955, which had a severe drought in the later part of the growing season, irrigation raised the yield of swedes by 24·1 hkg. dry-matter (root and tops) per ha., over the non-irrigated plots. [See also *Fld Crop Abstr.* 8 : 1421.]—J.K.L.

340 Demortier, G. and others. Essais de bonification des sables incultes de Campine à l'aide de déchets urbains (terres de bruyères de la Commune de Lommel). [**Trials on reclaiming the waste sandy soils of Campine by means of town refuse (heath lands of the municipality of Lommel, Belgium).**] *Rev. Agric., Brux.* 1957, **10**, No. 3, 291–359, illus., English summary.

341† Abeyratne, E. L. F. **Dry land farming in Ceylon.** *Trop. Agriculturist* 1956, **112**, No. 3, 191–229, bibl. 25.

The problems of dry-land utilization are discussed in relation to the traditional system of land use practised in the dry zone of Ceylon. Work in progress since 1950 at the Maha Illuppallama Dry Zone Research Station is reviewed and preliminary results of trials on mixed cropping, leguminous cover crops, weed control and crop improvement are indicated. The use of leys in the maintenance of soil fertility has so far been disappointing. The importance of a diversified system of land use in the dry zone is stressed.—M.P.

342† Karunaratna, C. R. **The progress of the dry farming schemes in Ceylon**

Trop. Agriculturist 1956, **112**, No. 3, 233–50, bibl. 2, illus.

343† Miles, L. G. **Dry farming patterns in Queensland.** *J. Aust. Inst. agric. Sci.* 1957, **23**, No. 3, 190–5, bibl. 5.

This is a brief review and is concerned mainly with the water requirements of crops and pastures and methods of moisture conservation.—M.P.

344 Aragones, S. G. **Tenancy, land-use, and farm management practices in Macalong, Asingan, Pangasinan.** *Philipp. Agriculturist* 1956, **40**, No. 4, 147–62. [Cent. Exp. Sta., Philippines]

WEEDS AND WEED CONTROL

Where weeds are specific to a crop, see under the crop concerned.

345† Thurston, Joan M. **Morphological and physiological variation in wild oats (*Avena fatua* L. and *A. ludoviciana* Dur.) and in hybrids between wild and cultivated oats.** *J. agric. Sci.* 1957, **49**, Pt 3, 259–74, bibl. 23, illus. [Rothamsted Exp. Sta., Harpenden, Herts]

Plants of all except one type of *A. fatua* were upright in habit with few tillers and averaged 95% dormant grains at harvest ; plants of *A. ludoviciana* were procumbent or prostrate at the maximum tillering stage with numerous tillers and the percentage of dormant grains was lower than in *A. fatua*. The taxonomy of wild oats is discussed. Chromosome counts on 11 selections showed that $2n = 42$.—From author's summary.

346 Bachthaler, G. Untersuchung zur Keimungsphysiologie des Flughafers (*Avena fatua* L.) im besonderen Hinblick auf sein zunehmendes Auftreten in Bayern und seine derzeitigen wirtschaftlichen Bekämpfungsmöglichkeiten. [**Physiology of germination of the wild oat (*A. fatua*) with special reference to its spread in Bavaria and the possibilities for its control.**] *Z. Acker- u. Pflbau* 1957, **103**, No. 2, 128–56, bibl. 119. [Inst. Acker- u. Pflbau, Weihenstephan, Bayern, W. Germany]

The spread of *A. fatua*, especially in fields of spring-barley, is a serious menace in Bavaria. The factors which influence its germination and development have been studied in pot experiments in the laboratory and in the field. These revealed that frequent alternation of frost and thaw and of rainy and dry spells between late autumn and early spring stimulate germination and cause mass infestation of wild oats (the " wild-oat years"). The seeds of *A. fatua* retained their viability in darkness and in light ; it was therefore concluded that germination was not influenced by type of plant cover. Results of field pot-experiments, in which *A. fatua* was allowed to germinate in soils of different geological origin, showed that sandy loam and loess clay favoured germination and growth, peaty soils favoured germination but not subsequent growth and that calcareous limestone was the least suitable for germination. No definite results were obtained regarding the use of specific soil nutrients by *A. fatua*. Results of farm trials with different crop rotations indicated that by reducing the cereal and increasing the fodder- and root-crops in a rotation there was a marked decrease in infestation with *A. fatua*. This is attributed to the intensive weeding in the potato- and beet-breaks in the rotation. [See also *Fld Crop Abstr.* 10 : 1152.]—D.B.

347 Naylor, J. M. and Christie, L. A. **The control of dormancy in wild oats.** *Proc. 10th W. Sect. Nat. Weed Cttee* 1956, 56–9, bibl. 3. [Univ. Saskatchewan, Saskatoon]

Investigations showed that wild oats [*Avena fatua*] were not necessarily dormant at maturity, but the state could be readily induced in non-dormant seeds by the action of a germination inhibitor formed in the hull. Initial results indicated that the hull played a greater part in seed dormancy, germination inhibition and protection of the seed against bacterial action than had previously been noted.—M.P.

348 Esbo, H. and Nilsson, B. Flyghavrens förekomst i vårt land. [**The occurrence of wild oat (*Avena fatua*) in Sweden.**] *Medd. Frökontrollanst., Stockh.* 1957, No. 32, 52–4, illus. [State Seed Test. Sta., Stockholm]

Apart from dissemination via infested grain it was found that seed of flax, lucerne, clover and grass such as meadow fescue often contained " naked " seeds of wild oat which were very difficult to separate. A survey made in 1955–6 by the central seed-testing station showed the occurrence of wild oat to be concentrated in the following areas : Uppsala-Enköping districts, Örebro, Östergötland, Gotland and western Scania.—J.K.L.

349 Kress, H. Eine einfache und sichere Methode zur Feststellung des Ackersenfbesatzes in Sommerrapssaatgut. [**A simple and reliable method for determining charlock contamination in seed of summer rape.**] *Z. landw. Versuchs- u. Untersuchwes. Rostock* 1956, **2**, No. 3, 255–7, illus. [Forschungsstelle f. Agrobiol. Pflzücht., Gülzow-Güstrow, E. Germany]

Seed of charlock, *Sinapis arvensis*, is placed singly in test-tubes and boiled for 1 hr. in 1 cc. 20% NaOH or KOH solution. On exposure to a Quartz lamp the solution exhibits a golden-green

fluorescence. Summer-rape seed similarly treated produces no such effect, nor does seed of winter-rape, rape, turnip, marrowstem kale and yellow mustard. The fluorescent substance has been shown to reside in the husk of the charlock seed.—M.P.

350† KERSTING, F. Zur Queckenbekämpfung mit TCA. [**Couch grass control with TCA.**] *Mitt. biol. BundesAnst. Berl.* 1957, **87**, March, 90–4, bibl. 3, illus. [Pflanzenschutzamt, Landw.-Kammer, Westfalen-Lippe, Germany]

Results to date indicate that ploughing before spraying was more effective than harrowing before spraying for the control of *Agropyron repens*. The effectiveness of 20–30 kg. TCA/ha. decreased when spraying was delayed beyond a week after cultivation, and when a volume rate greater than 600 l./ha. was used. Vetch, oats and rape sown 6 weeks after spraying were injured by 30 kg. TCA/ha.—M.P.

351† MEADLY, G. R. W. **Nut grass (*Cyperus rotundus* L.).** *J. Dep. Agric. W. Aust.* 1957, **6**, No. 4, 421–3, illus.

Control measures employed in Australia are outlined. They include : thorough cultivation of infested land while *C. rotundus* plants are dormant, followed, 2–3 weeks after emergence of new shoots, by spraying with 2–3 lb. a.e. 2,4-D/ac.; two ploughings 6 weeks apart followed by the application of 20 lb. monuron/ac. ; soil fumigation with 20 lb. methyl bromide/100 sq. ft., under gas-tight covers, after cultivation of the area to be treated. —M.P.

352† MCAULIFFE, J. D. ***Melilotus* taints grain and dairy products.** *J. Dep. Agric. S. Aust.* 1957, **60**, No. 10, 449–50, 458.

Melilotus indica, a serious weed in the cereal-growing districts of South Australia, can be controlled in pastures and fallows by cultivation treatments, combined with the use of hormonal herbicides, such as 2,4-D(amine) at 1 pt./ac. applied to young plants.—M.P.

353† NAUDÉ, C. P. **Chemical methods of control bring new hope.** *Fmg in S. Afr.* 1957, **33**, No. 4, 16–21, illus.

Jointed cactus, *Opuntia aurantiaca*, can be effectively controlled by the amyl and butyl esters of 2,4,5-T at 1·5 lb. a.e. in 10 gal. of paraffin [application rate not stated]. Every joint of the cactus must be sprayed if destruction is to be complete. Chemical control has been shown to be more economical and effective than mechanical methods.—M.P.

354† SOSA, G. R. Control de la vegetación sumergida en canales de riego. [**Control of submerged vegetation in irrigation canals.**] *Agron. trop., Maracay* 1956, **5**, No. 4, 253–8, illus., English summary. [Fac. Agron., Univ. Cent. Maracay, Venezuela]

An account is given of trials to control weeds by herbicidal treatment in the irrigation canals o Guataparo and Taiguaiguay in central Venezuela In Guataparo the weeds are mainly algae of th Characeae ; in Taiguaiguay *Anacharis* sp. is th predominant weed. Varsol plus 5% emulsifie gave effective control of the Characeae. Shell 2 plus 1% pentachlorophenol and 5% emulsifie gave excellent control of *Anacharis* sp.—E.B.O.

355† MUNE, T. L. and PARHAM, J. W. **Th declared noxious weeds of Fiji an their control.** *Bull. 31 Dep. Agric. Fiji* 1956 pp. 73, bibl. 25, illus., 2s.

Notes are given on the geography and climat of Fiji; weeds and their distribution; methods o herbicide application ; the proprietary lines o hormone herbicides distributed in Fiji. The 1 noxious weeds listed include : *Sorghum halepense S. halepense* forma *muticum*, *Ischaemum rugosum*, *Sid acuta*, *Xanthium pungens*, *Lantana camara* and *Eich hornia crassipes*. Each weed is described and illus trated by line drawings ; its means of dispersal i mentioned and the control measures available ar outlined. A key for the identification of the weed is given. References to these weeds in publication of the Department of Agriculture of Fiji are listed —M.P.

356† THISTLE, A. **The biological control o noxious plant species in Hawaii.** *Worl Crops* 1957, **9**, No. 11, 446–9, illus. [Hawaii]

Attemps to control *Lantana camara*, *Cyperu rotundus*, *Eupatorium adenophorum*, *Opuntia megacantha Clidemia hirta*, *Schinus terebinthifolius*, *Myrica faya* an *Ulex europaeus*, by the introduction, to Hawaii, o insect pests of these species are described.—M.P.

357 FRIESEN, G. **The herbicidal action o CMU [3 - (p - chlorophenyl) - 1,1 - di methylurea] on Canada thistle (*Cirsiu arvense*).** *Diss. Abstr.* 1957, **17**, No. 2, 206–7 [State Coll., Washington]

358 HANSEN, H. Forsøg med forskellig ren holdelse af afgrøderne i et saedskifte. [**Th effects of weed control on crop yields.**] *Bere 537 Stat. Forsøgsvirk. Plantekult.* [Contained in *Tidsskr. Planteavl* 1957, **61**, No. 1, 17–34, Englis summary. [Aarslev Agric. Exp. Sta., Denmark]

During 1948–55, experiments were carrie out to study the effects of varying the intensity o weeding in the following rotation : wheat, oats beet, barley (undersown) and clover/grass. Thre different levels of weed-control cultivations wer used : (a) poor, (b) medium and (c) complete Weed-control cultivations did not increase th yields of cereals. In beet, the yields of dry-matte (root and tops) after treatments (a), (b) and (c

were 113, 115 and 117 hkg. per ha., respectively. Weeding the beet crop had very marked residual effects on the yields of the following crops of barley and clover/grass. The total yields of beet, barley and clover/grass (expressed in 100 food units per ha.) following the (a), (b) and (c) treatments in beet were : 202, 229 and 242, respectively.—J.K.L.

359† Abel, A. L. **The substituted urea herbicides.** *Chem. and Industr.* 1957, No. 33, 1106–12, bibl. 20. [Fisons Pest Control Ltd.]

A table gives the rates of monuron (also known as CMU) required under average conditions for the control of 20 common weed species. This preparation is formulated as a wettable powder containing 80% of the active ingredient and is applied as a spray. The best time for applying monuron is March–May at the rate of 20–60 lb./ac. The treatment is annual but after the first year the dosage can be reduced by 25%. For weeds such as horsetails (*Equisetum* spp.), coltsfoot (*Tussilago farfara*), dandelion (*Taraxacum officinale*) and plantains (*Plantago* spp.) which are resistant or semi-resistant, these rates must be increased or another weedkiller, e.g. 2,4-D, included in the treatment. Monuron gives better control of grasses than sodium chlorate.—E.B.O.

360 Boots Pure Drug Company Limited. **Technical communication on iso-cornox.** *Publ. Boots Pure Drug Co. Ltd., Nottingham* [n.d.], pp. 13, bibl. 5. [Received June, 1957]

Chemical and biological data are given on iso-cornox which contains 32% w./v. a.e. of an MCPP amine. It is recommended primarily for the control of *Galium aparine* in cereals and should be applied at 6 pt. in at least 20 gal. of water/ac., when the cereal is at the 6-leaf stage (of the main stem) until the beginning of shooting. Amongst other weeds for whose control it has been found of use are: *Stellaria media*, *Polygonum* spp., *Rumex* spp., *Convolvulus arvensis* and *Cirsium arvense*. Iso-cornox is toxic to clovers and its use on undersown crops cannot be recommended.—M.P.

361† Frankton, C. **1957 list of herbicidal products registered as of May 15, 1957.** pp. 31, Ottawa; Canada Dep. Agric., Prod. Serv.

Under the Pest Control Products Act, all herbicides offered for sale in Canada must be officially tested and registered annually. The 1957 list contains 340 products classified according to the active ingredient. For each is given the brand name, registration number, the registrant, formulation and quantity of guaranteed active ingredient. The names and addresses of registrants are listed. —D.B.

362 British Weed Control Conference. **Proceedings of the 3rd Meeting, 1956.** 1957, Vol. 1, pp. 431 ; Vol. 2, pp. 433–870. [For other papers see Abs. 168, 194, 219, 276.]

Papers presented included :

1. Some preliminary observations on the assessment of weed control [by hand or by hoes] in row crops. By J. R. A. Bleasdale and H. A. Roberts, pp. 651–4, bibl. 1.
2. Experiences with mixtures of herbicides, insecticides and nutrients for the control of plant diseases, pests and weeds. By H. I. Petersen, pp. 803–6. In Denmark, mixtures of MCPA (0·25 kg./ha.) with each of the following, 10 kg. manganous sulphate, 10 kg. copper sulphate, 10 kg. borax, 20 kg. potassium sulphate, 170 ml. parathion or 1 kg. DDT, tended to depress crop yields when sprayed on barley. Where MCPA ± DNC mixed with malathion or parathion was applied to flax, marked crop injury resulted ; experimental evidence indicated that the insecticides were the injurious components.—From *Weed Abstr.* 6 : 666.
3. The evaluation of 2 : 4-dinitro-6-isopropylphenol as a selective herbicide. By G. E. Blackman, pp. 303–10, bibl. 7.
4. Experiments to control wild oat using α-chloro-N,N-diallylacetamide (CDAA) and 2-chloroallyl diethylthiocarbamate (CDEC). By R. D. Blackett, pp. 55–64, bibl. 8. CDAA and CDEC were toxic to cereals and wild oats (*Avena fatua* and *A. ludoviciana*) only before the appearance of the first leaf. There was no injury from presowing application (1–3 weeks) to winter wheat, oats, barley, peas or sugar-beet. Post-emergence application to winter- and tick-beans were also harmless. Under British conditions, 6–12 lb. of the herbicides per ac. are necessary to control wild oats.—From *Weed Abstr.* 6 : 570.
5. Chemical control of couch grass in fallows. By P. F. Le Brocq and C. R. Beech, pp. 279–84. Excellent control of the foliage of *Agropyron repens*, *Agrostis gigantea* and *Arrhenatherum elatius* was obtained by autumn-application of dalapon (Na) at 10 lb./ac. and amino triazole at 12 lb./ac. Spring applications to *A. repens* were better than autumn, and 40 lb. dalapon/ac. caused death of rhizomes.—From *Weed Abstr.* 6 : 573.
6. Preliminary studies in the comparative ecology of [five] *Papaver* species. By I. M. McNaughton, pp. 189–96, bibl. 6.
7. Biology, ecology and control of wild onion and yellow rattle. By S. Håkansson, pp. 207–10, bibl. 1. For the control of *Allium vineale* in Sweden, spring ploughing was best ; the predominance of spring cereals in a rotation also appeared to suppress the weeds. Spring application of 1–1·5 kg. MCPA/ha. to winter cereals gave good control of *A. vineale*. Dinoseb at 4 l. sevtox/ha. was superior to MCPA for the control of *Rhinanthus major* in rye.
8. The establishment and growth of wild onion (*Allium vineale* L.) from aerial bulbils. By A. Lazenby, pp. 211–19, bibl. 3.

9. Chemical treatment of bracken. By Elsie Conway and J. D. Forrest, pp. 255–68, bibl. 26. Results of garden and field experiments are reported. Although the fronds of *Pteridium aquilinum* were destroyed by some of the chemicals, no instance of rhizome kill was recorded, at the herbicidal rates used.

10. Studies on the ecology of some species of the genus *Rumex*. By Patricia Chancellor, pp. 197–203, bibl. 5.

11. The relative toxicity of MCPA, MCPB, 2,4-D and 2,4-DB to weeds. By J. D. Fryer and R. J. Chancellor, pp. 357–77, bibl. 3. The 24 weed species studied included : *Ranunculus* spp., *Rumex* spp., *Sinapis arvensis*, *S. alba*, *Senecio jacobaea*, *Cirsium arvense*, *Polygonum* spp. and *Chenopodium album*.

12. Weed control and research development in Sweden. By E. Åberg, pp. 141–64, bibl. 15. This review includes some interim results of recent work carried out at the Royal Agricultural College, Uppsala. In a field of oats, the number of weed seeds left on the ground was higher when the crop was combined than when the crop was binder-harvested, stooked and threshed. Promising herbicides included MCPB (2 kg. a.e./ha.) for the control of *Ranunculus* sp., and dalapon [rate not stated] against *Equisetum arvense*. With MCPA (Na), droplet size was important for effective control of some weeds and of no importance for others.—M.P.

CROP BOTANY

363† Spreafico, L. Osservazioni sui metodi per determinare l'energia germinativa dei semi. [**Observations on the methods for determining the germinating energy of seeds.**] *Sementi elette* 1957, **3,** No. 4, 30–40, bibl. 9, illus., English and German summaries. [Ente Naz. Sementi Elette, Italy]

The methods, of easy practical application, used for determining the germinating energy of seeds are examined and discussed. These methods are : estimation by visual impression ; official Italian method (based on rapidity of germination) ; Pieper method (also based on rapidity of germination) ; Hiltner, or brickdust method ; and the paper-roll method. The last method is thought to be the most reliable and the possiblility of its adoption in Italy is discussed.—E.B.O.

364† Toniolo, L. Su di un nuovo metodo per la determinazione del vigore di germinazione in semi di *Medicago* spp. L. [**A new method for determining the germinating energy in seeds of *Medicago* spp.**] *Sementi elette* 1957, **3,** No. 3, 33–44, bibl. 46, illus. [Ist. Agron., Univ. Padova, Italy]

This new method for determining the germinating energy of seeds is based on the fact that seedlings of forage legumes sown in spring must often lift a compact layer of soil in order to emerge. This effort made by seeds is measured in the apparatus described. The technique for measuring the germinating energy of lucerne seeds by this method is : 100 seeds are sown in Petri dishes filled with river sand containing 40% of its maximum water-holding capacity ; the seeds are kept in a thermostatic oven at 25°C. for 24 hr. ; the apparatus is applied and the seeds are kept in the oven for another 36 hr. ; the effort made by the seeds is measured. The weights applied to the seeds have been fixed at 95 g., 165 g., 220 g. and 320 g. This new method is considered to be of considerable practical value.—E.B.O.

365 Yamamoto, M. **The decreased germination of dry-seeds soaked in water.** [Abstract] *Biol. Abstr.* 1957, **31,** No. 2, Abs. No. 5834. [Yamagota Univ., Japan]

Seeds of soyabean, pea, rice, wheat, rye and barley were placed in desiccators or moist chambers and were then soaked in de-ionized water at 25°C. for 2–10 hr., followed by germination on moist filter paper at room temperature or in soil under greenhouse conditions. Desiccated seeds decreased in germinating capacity after soaking for several hours, but germination was normal after moist-chamber treatment and soaking.—From abstract.

366† Lawrence, J. M. and others. **Comparative lysine content of seeds.** *Suppl. Pl. Physiol.* 1957, **32,** lvi. [State Coll. Wash., Pullman]

The mean lysine content of the seed protein of representatives of 8 plant families was in the following order : Leguminosae, Cruciferae, Umbelliferae, Liliaceae, Iridaceae, Compositae, Cucurbitaceae, Gramineae. The legumes had significantly higher contents than any of the last 4 families, and the grasses significantly lower contents than the others (except Cucurbitaceae). Variation among the different varieties of a species was relatively small, but the mean level for different species within a family could vary widely. The lysine content of the seed protein appeared to be a highly characteristic property of a plant species.—From summary.

367 Colli, L. and others. Ulteriori osservazioni sulla luminiscenza di plantule di graminacee e di leguminose. [**Further observations on the luminescence of grass and legume seedlings.**] *Ann. Fac. Agr., S. Cuore* 1956, **60,** 88–93, bibl. 5, English and French summaries.

Data are given of the intensity of light emitted by seedlings of wheat, bean, lentil and maize.—E.B.O.

368 Goedewaagen, M. A. J. De oecologie van het wortelstelsel der gewassen. [**Ecology of the root system in crop plants.**] *De plantenwortel in de landbouw*, 's-Gravenhage 1955, 31–68, bibl. 18, illus. [TNO Agric. Exp. Sta. and Soil Sci. Inst., Groningen] [Received May, 1957]

The subject is discussed under the following heads : Root growth in relation to the use of granular phosphates (illustrated by a trial with oats, in which the smallest granules (1·5 mm.) gave the best results). Signs of root adaptation to differing placement of fertilizers. Rooting in the subsoil and its importance for the plant. Effect of manurial treatment upon root growth in the subsoil (illustrated by trials with oats and rye). Adaptability of the deeper roots to the drying of the upper soil (illustrated by a pot trial with oats). Other factors influencing root growth in the subsoil, e.g. degree of subsoil fertility, amount of organic matter present and soil compactness. Importance of the water table in a profile with shallow rooting system (illustrated by trials with fodder-beet and oats).—G.M.R.

369 Kullmann, A. Zur Intensität der Bodendurchwurzelung. [**Intensity of root penetration in soil.**] *Z. Acker- u. Pflbau* 1957, **103**, No. 2, 189–97, bibl. 10, illus. [DAL-Inst., f. Acker- u. Pflbau, Müncheberg (Mark), E. Germany]

The intensity of root penetration was investigated from the soil standpoint. The criteria used in this paper for root penetration are root weight and root surface. The latter is important because of its relation to nutrient absorption and was determined from the formula $M=d/4\cdot V$ where M is the root surface, V the total root volume and d the average diameter (obtained from 50–100 measurements with the ocular micrometer). Root weight and root surface of several fodder plants were thus determined and the superiority of grasses over legumes as regards intensity of root penetration was quantitatively established.—D.B.

370† Gardner, I. C. and Bond, G. **Observations on the root nodules of *Shepherdia*.** *Canad. J. Bot.* 1957, **35**, No. 3, 305–14, bibl. 16, illus. [Dep. Bot., Univ. Glasgow, Scotland]

Experiments are described demonstrating nodulation and N-fixation by *S. canadensis* in a N-free culture solution. Nodulation occurred at pH6 and pH7, but not at pH5 ; it was suppressed by the presence of small quantities of N compounds in the culture medium. The ecological significance of the results is discussed.—D.B.

371† Eberhardt, F. and Martin, P. Das Problem der Wurzelausscheidungen und seine Bedeutung für die gegenseitige Beeinflussung höherer Pflanzen. [**The problem of root excretions and its significance in the reciprocal influence of higher plants.**] *Z. PflKrankh. PflSch.* 1957, **64**, No. 4, 193–205, bibl. 37, illus. [Inst. Pflschutz. Landw. Hochsch. Hohenheim, Stuttgart-Hohenheim, W. Germany]

The liberation of fluorescent compounds by roots of seedlings of *Lolium* spp., *Nigella* spp. and *Papaver* spp. was investigated by means of paper chromatography. In plants, experiments with those grown under changing moisture conditions liberated more fluorescent compounds (such as scopoletin) than plants grown in uniform humidity. It was concluded that if true root excretions play a role in the mutual relations between higher plants, it is a minor one, whereas the liberation of substances from decaying cells can be of importance. However, it is not likely that any of the compounds studied directly affects neighbouring plants under field conditions. Scopoletin, which is not stable in normal soils, is decomposed by streptomycetes and several other fungi.—From authors' summary.

372† Erickson, R. O. and Michelini, F. J. **The plastochron index.** *Amer. J. Bot.* 1957, **44**, No. 4, 297–305, bibl. 22, illus. [Earhart Pl. Res. Lab., California Inst. Technol.]

The plastochron index has been derived to specify precisely the developmental status of a vegetative shoot. It is a function of the serial number (n) of a leaf just longer than an arbitrary reference length and of the logarithms of the lengths of the leaves n and $(n + 1)$. The index is shown to be linearly related to time during vegetative growth and can be used as a time axis in many studies. The use of a similar leaf index is also advocated in developmental studies.—From authors' summary.

373 Mayer, F. Untersuchungen über den Einfluss von Cyanamid auf die Atmung von pflanzlichem Gewebe. [**The influence of cyanamide on the respiration of plant tissues.**] *Z. PflErnähr. Düng.*, 1957, **77**, No. 2, 129–40, bibl. 13, illus. [Inst. PflSchutz., Landw. Hochsch. Hohenheim, Stuttgart]

Cyanamide inhibits the O_2 intake by roots and hypocotyl of *Linum usitatissimum*. The higher the rate of respiration, the greater is the inhibition, whether the increased respiration rate is caused by a higher pH of the substrate or the addition of a respiration stimulant such as 2,4-dinitrophenol. Cyanamide at 3600 mg.N/l. caused respiration to cease within a few hours. A similar concentration of urea did not inhibit O_2 intake.—D.B.

374† Iljin, W. S. El agua y los procesos vitales de la planta. [**Water and the vital processes of plants.**] *Bibl. Cult. rur. 1 Minist. Agric. y Cria Venezuela* 1955, pp. 97, bibl. 191, illus. [Fac. Agric., Univ. Cent. Venezuela, Maracay] [Received June, 1957]

This is a review of the literature on the importance of water in the vital processes of plants. The effects of an excess of water, of drought, and drought resistance are aspects particularly examined.—E.B.O.

375 JOHNSON, C. M. and others. **Comparative chlorine requirements of different plant species.** *Plant and Soil* 1957, **8**, No. 4, 337–53, bibl. 6, illus. [Dep. Soils, Pl. Nutr., Kerney Foundation Soil Sci., Univ. California, Berkeley]

In water cultures, from which Cl was excluded, severe symptoms of Cl-deficiency were produced in sugar-beet and barley. Yield decreases, but no deficiency symptoms, were obtained in buckwheat and maize. The species least affected by low Cl-supply appeared to have a superior ability to obtain Cl from the air, but the Cl-concentrations in all species studied were not very different under low supply. Plants required *c.* 1 lb. of Cl per 10,000 lb. of dry matter, which exceeds the value for other micronutrients.—J.F.C.

376† GREENHAM, C. G. and DADAY, H. **Electrical determination of cold hardiness in *Trifolium repens* L. and *Medicago sativa* L.** *Nature, Lond.* 1957, **180**, No. 4585, 541–3, bibl. 8. [CSIRO, Div. Pl. Ind., Canberra, Australia]

Work recorded in *Aust. J. biol. Sci.* Vol. 10, No. 2, on the determination of injury caused by poisons suggested that the same test should be satisfactory for determining frost injury. The tissue under test is impaled on two needle tips (for example, 1·5 mm. long and 5 mm. apart), and the electrical resistance of the tissue is then measured at 1 kc./s. (R_{LF}) and at 1 Mc./s. (R_{HF}). The electrical resistance index $R_{LF}/R_{HF} \times 100$ is taken as the criterion for injury ; as was shown in the course of the present experiments, the magnitude of this index decreases with increasing duration of freezing or with increasing severity of freezing, becoming approximately 100 at death. The arithmetical factor of 100 is included in the index for convenience. From tests on the application of this resistance index method with ecotypes or strains of the above crops it is claimed that discrimination between cold-susceptible and cold-hardy strains can be rapidly made (2 assistants can measure 120 plants in 8 hr.). A means of predicting the recovery of plants from cold injury is also indicated.—M.H.

377† STEPANOV, V. N. [**Biological classification of crops.**] [Russian] *Izv. Timirjazevsk seljsk. Akad.* (*Bull. Timirjazev agric. Acad.*) 1957, 2 (15), 5–29, bibl. 24.

Depending on their general requirements for light and warmth, all crops are naturally distributed within two climatic/ecological categories : (1) plants growing in a temperate climate and in the winter-season of a subtropical climate ; and (2) plants growing in a tropical climate and the summer season in a subtropical climate. There is discussion (and classification in tables) of the reaction (in regard to phasic development, requirements of °T in summation, and frost resistance) of spring and winter annuals, of biennials and perennials under the influence of variation in temperature and daylength characteristic of the tropical and temperate zones.—M.H.

378† TCHAN, Y. T. and BEADLE, N. C. W. **Nitrogen economy in semi-arid plant communities. 2. The non-symbiotic nitrogen-fixing organisms.** *Proc. Linn. Soc. N.S.W.* 1955, 97–104, bibl. 15, illus.

The N-fixing bacteria *Azotobacter* and *Clostridium*, and the blue-green algae *Nostoc* and *Anabaena* spp. have been recorded from some semi-arid soils. Soils of a heavy texture supporting a grassland of *Astrebla pectinata* and scrubs of *Acacia victoriae* appear to contain *Azotobacter* consistently. Frequency of *Azotobacter* cells only once exceeded 50 per g. of soil, and the possible maximum contribution to the N capital of the soil by the species is *c.* 0·1 lb./ac. p.a. Low organic matter, high summer temperatures, low soil moisture, and in a few cases low P and Ca levels, prevented the successful activity of *Azotobacter*. The numbers of blue-green algae capable of fixing N vary considerably and do not appear to be correlated with any environmental factor. Their possible maximum N contribution is estimated as *c.* 3 lb. N/ac. p.a. [See also *Fld Crop Abstr.* 9 : 1392.]—From authors' summary.

379† WYBENGA, J. M. **A contribution to the knowledge of the importance of sodium for plant life. Investigations with radioactive sodium.** *Diss. D. Agric. Sci., Agric. Univ., Wageningen*, 1957, pp. 211, bibl. 297, illus.

The movement of Na into, and out of, the roots of oats and other plant species and its distribution throughout the plants were studied, using $NaNO_3$ labelled with ^{22}Na in water- and sand-culture. Certain Na-deficiency symptoms were demonstrated. Species differed much in the extent to which Na was translocated from roots to stems. Na-accumulation was stimulated by top-dressing with Na and the percentage Na-content of plant organs increased with age. Unlike the leaves, the stems accumulated considerable amounts of Na, even when it was applied late in the growth-cycle. Na reduced the transpiration coefficient and delayed wilting.—J.F.C.

380 SKOK, J. **The substitution of complexing substances for boron in plant growth.** *Pl. Physiol.* 1957 **32**, No. 4, 308–12, bibl. 14, illus. [Argome Nat. Lab., Lemont, Illinois]

381 Bukovac, M. J. and Wittwer, S. H. **Absorption and mobility of foliar applied nutrients.** *Suppl. Pl. Physiol.* 1957, **32,** xxxix. [Michigan State Univ., East Lansing]

382 Wort, D. J. **The foliar application of minor elements with 2,4-D.** *Proc. 10th W. Sect. Nat. Weed Cttee* 1956, 52–6. [Dep. Bot., Univ. Brit. Columbia]

The investigations reported were continuations of similar work done in 1955 [see *Fld Crop Abstr.* 780] on sugar-beet, potatoes and maize.—M.P.

383 Kloke, A. Untersuchungen über die Aufnahme organischer kontaktinsektizider und bakterizider Verbindungen durch die Pflanze. [**Investigations into the absorption of organic contact insecticides and antibiotics by the plant.**] *Z. Acker- u. Pflbau* 1957, **103,** No. 2, 181–8, bibl. 23, illus. [Agrikulturchem.- und Bodenkundl. Inst., Univ. Göttingen, W. Germany]

Experiments on rye have demonstrated that antibiotics and systemic insecticides with a molecular weight of 300–400 are absorbed by the plant root and transported to other parts where they exert their specific action. Because their accumulation in plant organs would in time be harmful to man and animals, the ethics of increasing crop yields by making a general practice of treating farmland with these substances is questioned. It is suggested that only those plant protection agents which undergo early decomposition in the plant should be used on farm land. —D.B.

384† Peredel'skiĭ, A. A. and others. [**The role of earthworms in cleaning soil from pollution with radio-active isotopes.**] [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR)* 1957, **115,** No. 4, 809–12, bibl. 2. [Biophysics Lab., Uralsk Filial Acad. Sci., USSR]

It is recognized that as a result of the explosion of atomic and hydrogen bombs (and also as a consequence of work in nuclear reactors) there is now extensive pollution by radio-active isotopes of the earth's atmosphere, rainfall, water supplies and soils. Because some of these isotopes disintegrate slowly, quantities are accumulating and constitute a menace. It has been postulated that dispersal [not disintegration] of the radio-active substances is accelerated by the capacity of living organisms to accumulate the isotopes within their tissues. On the basis of this hypothesis, the authors made the following experiment. Two wooden boxes (A and B), 160 cm. long, 8 cm. wide and 50 cm. deep were almost filled with a mixture of garden earth (85%) and sand (15%). At a distance of 10 cm. from one of the short walls (and parallel to it) in both boxes a trench (8 cm. wide) was dug. The earth from each trench was mixed with a water solution of $^{60}CoCl_2$, having 10 mc. activity. This contaminated earth was scattered in the trenches. At the same time in box A, in the earth between the short wall and the contaminated mound there were placed 25 living earthworms at a depth of 15–17 cm. In each box the following plant species were evenly sown (in g.) : barley 16, oat 15, millet 2, *Agropyron* 2, ryegrass 2, *Phleum pratense* 1·5, peas 15, clover 1·2, lucerne 1·8, vetch 12, *Lathyrus* 12, *Ervum* 10, *Brassica* 1·5, *Polygonum* 6, flax 2·2, and hemp 10. The test was started on 14 July. Subsequently more earthworms were placed in the same position in box A, 24 on 8 Aug. and 49 on 10 Aug., making total of 98. At the end of the test (29 Aug.) only 17 worms remained there and it is concluded that they had dispersed throughout the soil and/or had escaped. After 24 and 44 days from the beginning of the test determination was made of the radio-activity in tops and roots of the individual plants in both boxes : (a) in the area where ^{60}Co was placed, and (b) 20 cm. from this location. From this report of part of the results there is evidence that : (1) *Brassica* sp. accumulated the least amount of ^{60}Co compared with the remainder of the plants. (For example, after 44 days there were 536 counts/min./1g. *Brassica* dry wt. from box B (a) and 2890 counts from box A (a), while for the legumes the figures were 1070 and 3400, respectively. It is observed that in *Brassica* the accumulation of ^{60}Co in the presence of earthworms is more than 5 times that without earthworms and although the accumulation in the remaining plants is consistently higher than in *Brassica*, the presence of earthworms produced some increase, but this was much less than 5-fold ; (2) plant roots accumulate a greater amount of ^{60}Co than do the tops (in the grasses after 24 days at (a) with earthworms there were 5620 counts in the roots and 310 in the tops). While there is evidence that radio-activity is lessened after 44 days from the beginning of the test compared with 24 days, there are, however, some instances of mounting activity in the absence of earthworms in both the tops and roots of plants (e.g. in *Brassica* roots the increase was from 245 counts without earthworms after 24 days to 336 counts after 44 days). On the other hand, in grass tops in the presence of earthworms the increase in radio-activity is pronounced (310 counts with earthworms after 24 days, and 990 after 44 days). There is also evidence that, at a distance of 20 cm. from the placing of ^{60}Co in the soil, there is a greater accumulation of the isotope in the plants grown in the presence of earthworms. It is concluded that earthworms (and other soil organisms) will dissipate accumulations of isotopes in the soil and bring the level to more natural proportions.—M.H.

385† Russell, R. S. and Milbourn, G. M. **Rate**

of entry of radioactive strontium into plants from soil. *Nature, Lond.* 1957, **180,** No. 4581, 322–4, bibl. 3, illus. [A.R.C. Radiobiol. Lab., Compton, nr. Newbury, Berks]

An experiment designed to study this problem has been carried out with ^{89}Sr (half-life 54 days) during 1956 on a chalk downland in Berkshire. This short-lived isotope was used (in preference to ^{90}S) for safety reasons. Under conditions of the test there is some indication that less than 1% of ^{89}Sr was recovered by crops in one year. The data suggest that the absorption of fall-out Sr by crops cannot be affected by alteration in cultivation methods.—M.H.

386† Behrens, W. U. Bestimmung der radioaktiven Phosphorsäure in der lebenden Pflanze. [**Determination of radioactive phosphorus in the living plant.**] *Landw. Forsch.* 1957, Sonderheft 9, 68–74, bibl. 2, illus. [Landw. Versuchsstat. der Kali-Chemie A. G., Hannover, W. Germany]

The method described allows a more accurate determination of ^{32}P in grasses and cereals which have passed the seedling stage than the methods hitherto in use.—D.B.

387† Puffeles, M. and Nessim, N. E. **Comparison of flame-photometric and chemical methods for determining sodium and potassium in soil, plant material, water and serum.** *Analyst, Lond.* 1957, **82,** No. 976, 467–74, bibl. 22, illus. [Lab. Chem. Anal., Minist. Agric., Tel-Aviv, Israel]

388† Belfield, W. and Johnson, R. W. **A thermistor probe.** *J. sci. Instr.* 1957, **34**, No. 5, 209, illus. [Univ. Coll., Accra, Ghana]

An instrument for accurately measuring to a tenth of a degree at low temperatures (20–30°C.) is described ; it has proved satisfactory for both laboratory and field use. Preliminary trials have shown that 2 such thermistors in a Wheatstone bridge can be used to measure very small differences in air movement, viz. 1 in./sec.—M.P.

389† Withrow, R. B. and Price, L. **A darkroom safelight for research in plant physiology.** *Pl. Physiol.* 1957, **32,** No. 3, 244–7, bibl. 13, illus. [Smithsonian Inst., Washington, D.C.]

390† Plant Protection Limited. **Gibberellic acid.** [1957], pp. 35, bibl. 47, Haslemere, Surrey ; Fernhurst Res. Sta., 28 × 21·5 cm. [Received Oct., 1957]

Information is given on the history of the development of gibberellic acid, and its physical, chemical and biological properties. Suggestions are made for experimental applications on a variety of agricultural and other crops. It is intended to publish appendices from time to time, and so keep this booklet up-to-date. Most experimental results on a wide range of crop plants so far published are summarized. The crops used include : cereals, root-, oil-, fibre- and leguminous-crops, grasses, pastures, turf, lucerne and *Trifolium* spp.—M.P.

391† Essenberg, J. F. Gibberelline. Een literatuuroverzicht. [**Gibberellin. A review of the literature.**] *LandbDocumentatie* 1957, **13,** No. 35, 259–66, bibl. 11.

The review contains a section on gibberellin in relation to grassland and crop production.—G.M.R.

392 Wittwer, S. H. and Bukovac, M. J. **Gibberellin effects on temperature and photoperiodic requirements for flowering of some plants.** *Science* 1957, **126,** No. 3262, 30–1, bibl. 5. [Dep. Hort., Michigan State Univ., East Lansing]

The induction of flowering by gibberellin in a large number of genera and species grown under conditions not conducive to flowering is described. Often a single application of gibberellin was sufficient to induce flowering in a wide variety of crops grown under temperatures (cold-requiring biennials) and photoperiods (long-day annuals) normally unsuitable for flowering. All cold-requiring biennials grown under temperatures close to, but slightly above, the known inductive values were induced to flower. Kale, turnip and mustard (*Brassica juncea*) were included in the studies.—J.F.C.

393† Bukovac, M. J. and Wittwer, S. H. **Gibberellin and higher plants : 2. Induction of flowering in biennials.** *Quart. Bull. Michigan State Univ.* 1957, **39,** No. 4, 650–60, bibl. 3, illus.

Various biennials, including beet, kale and turnips, grown at temperatures (10–13°C.) slightly above the critical temperature for flower formation, were induced to flower by gibberellin, which was applied at 100–1000 ppm. in one or several foliar sprays or in weekly doses of 0·1 mg. to the stem apices. With several exceptions, plants not treated with gibberellin remained vegetative when grown at a night temperature of 10–13°C. When grown at 15–18°C. and treated with gibberellin, few or none of the plants flowered. All gibberellin-treated plants produced greatly elongated stems and much stem elongation preceded the appearance of flower buds in those plants which flowered. It was concluded that gibberellin promotes flowering in biennials which require low-temperatures for flowering, but not unless the plants are grown at temperatures close to those which normally induce flowering.—From authors' summary.

394 Wittwer, S. H. and Bukovac, M. J.

Gibberellin and higher plants. 3. Induction of flowering in long-day annuals grown under short days. *Quart. Bull. Michigan State Univ.* 1957, **39,** No. 4, 661–72, bibl. 12, illus.

Brassica juncea was grown under a 9–11-hr. photoperiod at 10–13°C. and under an 18-hr. photoperiod at 15–18°C. Gibberellin was applied to the apices at 0·1 mg. per plant 6 weeks after germination and subsequently at 3-week intervals. All the plants eventually flowered, but those treated with gibberellin flowered 9–29 days earlier, depending on the temperature and photoperiod. Seed-stalks were several times taller after gibberellin treatment.—J.F.G.

395 Wittwer, S. H. and Bukovac, M. J. **Gibberellin and higher plants. 8. Seed treatment for beans, peas, and sweet corn.** *Quart. Bull. Mich. agric. Exp. Sta.* 1957, **40,** No. 1, 215–24, bibl. 7, illus.

Pea and beans seed were soaked for several hours in aqueous solutions containing concentrations of gibberellin, ranging from 1 to 1000 ppm. The treatment significantly increased the rate of germination and emergence, particularly at low temperatures. The greatest effect was obtained where concentrations of 250 ppm. were used. In further experiments, pea, bean and sweet-corn seeds were treated with slurries containing concentrations of gibberellin ranging from 500 to 100,000 ppm., before being sown in greenhouse flats and in the field. Except in the case of sweet-corn, all concentrations resulted in an acceleration of seedling emergence ; with sweet-corn, this effect was only noticeable over a very short period though elongation of seedling hypocotyls was marked. It appeared that concentrations of 500 or 1000 ppm. gibberellin might be of practical value ; concentrations above 1000 ppm. resulted in abnormal elongation of hypocotyls, internodes, leaf petioles, and other distortions.—P.J.B.

396 Langridge, J. **Effect of day-length and gibberellic acid on the flowering of *Arabidopsis*.** *Nature, Lond.* 1957, **180,** No. 4575, 36–7, bibl. 5, illus. [CSIRO, Canberra]

A. thaliana is a facultative long-day plant. Data obtained with the rapidly-growing race Estland (which does not respond to vernalization) show that the effect of gibberellic acid is in the nature of an acceleration of flowering. It remains to be determined if the acid will cause flower formation in an obligate long-day plant.—M.H.

397 Olsson, G. and Ellerström, S. **Report on a plant collection expedition in Mediterranean countries in the summer of 1956.** *Circ. Pl. Exp. 1/57 FAO* 1956, pp. 13. [Swedish Seed Assoc., Svalöf]

This is a preliminary report on an expedition to Italy, Greece, Turkey and Yugoslavia in order to collect plant material of value in the breeding of agricultural plants in Sweden. The material collected, mainly ripe seeds, was of wild species, unimproved cultivated varieties and bred varieties from the breeding institutes in the countries visited. Living plant material of *Brassica oleracea* and *Beta* spp. was also collected. Among the samples collected were : cruciferous oil plants (220), poppy (21), flax (63), peas and other large-seeded legumes (903), rye (58), wheat (138), barley (94), oats (56) and *Beta* spp. (94).—E.B.O.

AGRICULTURAL METEOROLOGY AND CLIMATOLOGY

398 Uhlig, S. Die klimatisch-phänologischen Voraussetzungen für den Zwischenfruchtbau im Weser-Ems-Gebeit. [**The climatic phenological conditions for catch-cropping in the Weser-Ems basin.**] *Z. Acker- u. Pflbau* 1957, **103,** No. 2, 113–27, bibl. 7, illus. [Abt. Agrometeorologie des Deutschen Wetterdienstes]

399 Baumann, H. Pflanzenphysiologische und bodenkundliche Betrachtungen zur Frage der Beziehungen zwischen Witterungsverlauf und Ernteertrag. [**The relation between the course of the weather and yield considered as a plant-physiological and soil-science question.**] *Albrecht-Thaer-Archiv* 1956, **1,** No. 4, 299–316, bibl. 14, illus. [Humboldt Univ., Berlin]

400† Tucker, B. M. **An alternative calculation for potential evapotranspiration.** *Trans. roy. Soc. S. Aust.* 1956, **79,** 46–51, bibl. 10. [CSIRO, Div. of Soils, Adelaide]

An empirical method for the approximate calculation of potential evapotranspiration has been developed for application to stations where maximum and minimum temperatures are recorded, but no humidity data are available. From the difference between saturated water vapour pressures at the normal monthly mean and minimum temperatures an estimate of standard tank evaporation E to the power 0·75 can be obtained. This value may then be used in Prescott's formulae for potential evapotranspiration. The method may also be used as a means of extrapolation from stations which keep humidity records to those which do not.—Author's summary.

401† Duvdevani, Sh. **Dew research for arid agriculture.** *Discovery* 1957, **18,** No. 8, 330–4, illus. [Dew Res. Sta., Karkur, Agric. Res. Sta., Rehovot, Israel]

402† Ramdas, L. A. **Natural and artificial modification of microclimate.** *Weather* 1957, **12,** No. 8, 237–40. [New Delhi]

403 Kato, Y. and Suzuki, T. **On the effects of smoldering for the prevention of frost damage.** *Rep. Inst. agric. Res. Tôhoku Univ.* 1956, **7**, No. 2, 119–23, illus.

A new apparatus (illustrated) was used for measuring the difference between the upward radiation from the ground and the downward radiation from the sky. Results are recorded in 9 graphs.—D.B.

MISCELLANEOUS

404 Government Committee for the Compilation of the List of Varieties of Field Crops, Netherlands. 32 Beschrijvende Rassenlijst voor landbouwgewassen. [**Thirty-second descriptive list of varieties.**] Wageningen, 1957, pp. 333, English commentary.

405 Webster, T. **Crop variety testing.** *Rep. Nottingham Univ. Sch. Agric. 1956*, 1957, 47–52.

The main results are given of varietal trials with winter- and spring-wheat, spring barley, spring oats, winter beans, potatoes and sugar-beet, carried out around Nottingham during 1954–6 as part of the N.I.A.B. regional trials.—M.P.

406† Kaltofen, H. Über Feldversuche einfachster Struktur. [**Field trials of the simplest design.**] *Z. Acker- u. Pflbau* 1957, **103**, No. 3, 315–32, bibl. 15, illus. [Leipzig, E. Germany]

After dealing with the results which can be obtained by statistical methods from suitably designed trials, it is shown that useful conclusions can be drawn by non-statistical means. Directions are given for experimentation, especially where statistical treatment of results is not possible.—D.B.

407† Behrens, W. U. Feldversuchsanordnungen mit verbessertem Ausgleich der Bodenunterschiede. [**The arrangement of field experiments with improved compensation for soil variations.**] *Z. landw. Versuchs- u. Untersuchwes. Rostock* 1956, **2**, No. 3, 176–93, bibl. 5, illus. [Hannover]

[See also *Fld Crop Abstr.* 10 : 333.]

408† Müller, K.-H. Exakte Auswertungsverfahren des kontrollierten Anbauvergleiches. [**Accurate method of evaluating controlled, comparative cultivation-trials.**] *Z. landw. Versuchs- u. Untersuchwes. Rostock* 1956, **2**, No. 3, 153–61, bibl. 9. [Inst. Landw. Versuchs- u. Untersuchwes., Jena]

The lay-out and statistical analysis of the method suggested are described.—M.P.

409† Panse, V. G. **Estimation of crop yields.** *Publ. FAO* 1954, pp. 61, bibl. 16. [Received July, 1957]

This manual gives an account of current methods and an analysis of crop-cutting procedures, attention being confined to the measurement of yield at harvest.—E.B.O.

410 Harmond, J. E. **A versatile plot thresher.** *Publ. ARS 42–4 U.S.D.A.* 1956, pp. 6, illus. [Oregon Agric. Exp. Sta., Corvallis]

A description is given of a new machine suitable for threshing small quantities of seed of divers crops, including wheat, barley, oats, proso millet and buckwheat.—J.F.C.

411† Pfeifer, R. P. **Improvements in the bird-control apparatus for experimental plots.** *Agron. J.* 1957, **49**, No. 6, 338, bibl. 1. [Wyoming Agric. Exp. Sta., Laramie]

In an improved design of electrified perch for bird control, a 15,000 volt, 30–60 milliamp. neon-sign transformer proved satisfactory. Where good control can be obtained by shocking without killing the birds, a 15 or 30 milliamp. transformer is suitable. Perch wires built around a 4-ac. field gave complete control.—J.F.C.

412 Cook, R. L. **Fertilizer placement for better crops.** *Bett. Crops* 1957, **41**, No. 6, 14–22, bibl. 6, illus. [Michigan Agric. Exp. Sta.]

Conclusions are drawn from placement experiments conducted since 1934. Fertilizer for maize, potatoes, sugar-beet and beans should be applied in a band to the side of, and below, the seed. For maize, the split-boot applicator has proved unsatisfactory, but good results were obtained with a planter which placed fertilizer in a band 2 in. to the side of the grain and at both 2 in. and 6 in. below the seed. The solubility of the P-fertilizer in water influences the placement and particle-size which should be used.—From author's summary.

413 Amberger, A. and others. Über die Wirkung einer langjährigen Phosphorsäuredüngung mit Handelsdüngern und Stallmist auf Boden und Pflanze. [**The action of long-term manuring with commercial phosphoric acid fertilizers and farmyard manure on soil and plant.**] *Bayer. landw. Jb.* 1957, **34**, No. 2, 229–48, bibl. 9. [Inst. Agrikulturchemie Weihenstephan der Techn. Hochsch. München, W. Germany]

Independent of the 3 mineral forms in which P was applied, the following yield increases were obtained in a 20-yr. experiment in which P was applied to crops growing in a mildly acid loess-clay soil : winter wheat, 35–41% grain and 20% straw ; spring barley, slightly lower than wheat ; potatoes, 15–19% ; sugar-beet, roots 100% and

tops 35·5% ; fodder-beet, slightly lower than sugar-beet ; winter-rape and winter-turnip-rape (seed and tops), 18–25%. The percentage utilization of P by the crops was : winter wheat, 20 ; spring barley, 14 ; potatoes, 7 ; sugar-beet, 41 ; fodder-beet, 20 ; oil crops, 30.—D.B.

414† Department of Scientific and Industrial Research. New Zealand. **Proceedings of the Conference on Soil Moisture held at Dominion Physical Laboratory, Sept. 1954.** *DSIR Inform. Ser. 12*, 1956, pp. 174, illus., Wellington, 12s. 6d. [Received July, 1957]

The Conference was concerned with soil-moisture problems of agricultural significance and excluded those of more importance to engineers. The following papers are included among the 16 recorded : Soil moisture for plant growth, by R. Q. Packard ; Soil moisture in relation to pasture growth, by K. J. Mitchell and G. W. Butler ; Dew as a factor in plant-water balance, by R. L. Jones ; On the estimation of irrigation needs in New Zealand, by B. D. van't Woudt ; The estimation of natural evaporation and water need, by J. F. Gabites ; Penman's method for estimating soil moisture from evaporation, by R. L. Closs ; Techniques of soil-moisture measurement, by P. F. Noble ; and Soil moisture determination by neutron methods, by G. J. McCallum.—M.H.

415† Schulze, E. and Schulze-Gemen, P. Der Wasserhaushalt des Bodens im Dauerdüngungsversuch Dikopshof (1953/54). [**The water economy of the soil in continuous manurial trials.**] *Z. Acker- u. Pflbau* 1957, **103**, No. 1, 22–58, bibl. 109, illus. [Inst. für Pflanzenbau, Univ. Bonn]

Rye and wheat made their greatest demands on stored soil water during earing and flowering, potatoes about the time of flowering from mid-June to mid-July, and sugar-beet from June to mid-August. The quantity of water used per kg. dry matter [of the yield] was greater in wheat than in rye and potatoes, and was least in sugar-beet. On plots deprived of added N, P, K or NPK, the amount of water used per kg. dry matter increased. The results supported Gliemeroth's findings that manured plants had greater energy, penetrated more deeply and used water from deeper layers of soil. Fertilizers and stable manure not only increased yields but also improved the water economy of the soil.—D.B.

416 Christensen, H. and Dorph-Petersen, K. Forsøg med kalk og mikronaeringsstoffer på nyopdyrket hedejord. **Experiments with lime and micronutrients on a newly reclaimed heath-soil at Hornum [Jutland].** *Beretn. 528 Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl.* 1956, **60**, No. 3, 486–503, bibl. 8, English summary. [Hornum Res. Sta., Denmark]

Ground agricultural lime was applied at rates of 2, 4, 6, 8 and 16 tons/ha. in 1939 on newly reclaimed heath-land (diluvial sand on a subsoil of loamy sand) giving pH-values (1942) of 4·8, 5·0, 5·5 and 6·3, respectively. The crop rotation was rye/clover + grass/oats/swedes/oats/potatoes. Except for oats, the highest yields were obtained with the maximum dose of lime, when Mn, Cu, and B were also applied. $MnSO_4$ and $CuSO_4$ were applied to the cereal crops at rates of 25 and 50 kg./ha. and borax to swedes and potatoes only, at 15 and 30 kg/ha. The Mn-content of the soil varied from 3·7 to 5·6 ppm., and the addition of $MnSO_4$ showed little improvement. Mn-deficiency symptoms occur [in Denmark] generally only where soils contain less than 2 ppm. Mn. Cu increased yields of oats, rye, barley/oats and clover/grass on the heavily-limed soils [pH 5·5 and 6·3], but on the soil which had received 2 tons/ha. of lime [pH 4·8] Cu-application lowered the yield of rye and clover/grass. B had no significant effect on swedes and potatoes ; a single experiment with carrots [1941] showed a negative effect from borax-applications at low, and a positive effect at high, pH-values.—J.K.L.

417 Henkens, C. H. Onderzoek over molybdeengebrek. [**Research on molybdenum deficiency.**] *Landb Voorl.* 1957, **14**, No. 5, 213–7. [Inst. for Soil Fertility, Groningen]

Mo deficiency is found in many places in the Netherlands [see *Fld Crop Abstr.* 8 : 690] and is expressed particularly in beet and rye crops. Symptoms are evident in the early stages of growth; in beet the young leaves are whitish, stiff, and gutter-shaped, while the cotyledons remain green. In rye the leaves are pale with irregular white patches, the tips sometimes dying off. Yield can be greatly reduced. Remedial measures are primarily the reduction of soil acidity to a normal level, and in some cases an application of 2–3 kg. sodium- or ammonium-molybdenate per ha. is effective, dusted over the crop. Sprinkling with a 0·05% solution of sodium molybdenate at the rate of 500 l. per ha. has also given good results.—G.M.R.

418 Haynes, H. L. and others. **Insecticidal properties and characteristics of 1-naphthyl N-methylcarbamate.** *Contr. Boyce Thompson Inst.* 1957, **18**, No. 11, 507–13, bibl. 9.

In field tests, sevin, a new insecticide, was evaluated in formulations of 25–50% wettable powders, 24% emulsifiable concentrates and 5% dusts, at rates of 0·5–2 lb./ac. active ingredient and in 100 gal. water, where required. A high degree of toxicity was shown towards the Colorado potato beetle (*Leptinotarsa decemlineata*), the potato flea beetle (*Epitrix cucumeris*), the corn earworm (*Heliothis zea*) and the potato leaf-hopper (*Empoasca fabae*). Its residual activity lies between that

of TEPP and DDT. No injury was caused to maize, cotton or other crops.—J.F.C.

419† Miller, E. J. **The use of toxic chemicals in agriculture.** *NAAS Quart. Rev.* 1957, No. 36, 47–52. [Pl. Path. Lab., Harpenden, Herts]

420 Gunthart, E. and Bernet, R. Über die Gefahren bei der Anwendung von Insektiziden für Mensch und Tier und die Möglichkeiten, ihnen zu begegnen. [**The dangers to men and animals from the application of insecticides and the possibilities for counteracting them.**] *Schweiz. landw. Mh.* 1957, **35**, No. 8, 385–98, bibl. 4. [Biol. Lab. Dr. R. Maag, A.G., Dielsdorf-Zürich]

421 Bärner, J. Bibliographie der Pflanzenschutzliteratur 1946–1947. **Bibliography of plant protection. 1946-1947.** 1957, pp. 460, Berlin ; Verlag Paul Parey ; D.M. 44, 50.

422† Ministry of Agriculture, Fisheries and Food. **Agricultural science and the farmer.** 1957, pp. 11, illus., London ; Minist. of Agric., Fish., Fd.

A general description is given of the public scientific services for agriculture in England and Wales. The way in which the different organizations involved interlock is also explained.—G.L.S.

423† Hunt, K. E. **Colonial agriculture statistics. The organisation of field work.** *Colon. Res. Publ. 22*, 1957, London ; Colon. Office, pp. viii + 123, bibl. in text, illus. [Agric. Econ. Res. Inst., Univ. Oxford]

This is substantially a revised version of 'Statistics for colonial agriculture', published in 1951. [See *Fld Crop Abstr.* 6 : 399.] Part 1 deals with the direct collection of information by surveys, censuses and other enquiries organized specifically for obtaining agricultural statistics ; Part 2 covers preparatory work and the training of staff ; Part 3 contains appendices on field and office techniques.—M.P.

424† Ministry of Agriculture, Belgium. Het landbouwkundig onderzoek in België 1956. [**Agricultural research in Belgium, 1956.**] 1956, pp. 153, Brussels; Minist. Agric.

Information on current research in Belgium is presented in three parts. Index of institutes, pp. 1–42 (pastures and field crops, pp. 6–9, plant breeding, pp. 13–6). Index of workers, pp. 43–99. Index of projects, with the names of workers and their institutes, pp. 103–53 (plant index, pp. 111–31 ; crop cultivation including seed production, pp. 132–6 ; weed control, pp. 139–40).—G.M.R.

425† Proefstation voor Akker- en Weidebouw, Wageningen. Lijst van proeven en proefbedrijven van Rijkslandbouwconsulenten en andere instanties 1957. [**List of experiments and experiment farms under the control of the State Agricultural Advisers and of different institutions, 1957.**] *Meded. Landb Voorl-Dnst* 1957, No. 73, pp. 119.

426† FAO. **Report of the first meeting of the European contact group on the uses of isotopes and radiation in agricultural research held at Wageningen, The Netherlands, 10-14 December, 1956.** *Meet. Rep. 1956/27 FAO*, pp. 39.

427 Yarwood, C. E. **Powdery mildews [Erysiphaceae].** *Bot. Rev.* 1957, **23**, No. 4, 235–301, bibl. 377, illus. [Univ. California]

The host range includes most cultivated plants, including wheat, barley, crucifers, cotton, peas and beans, but not maize and rice.—J.F.C.

428 Commonwealth Mycological Institute. **Common names of virus diseases used in the Review of Applied Mycology.** *Rev. appl. Mycol.* Vol. 35. Suppl., pp. 78. [Issued Aug., 1957]

This is a revision of the list issued in 1946.—M.P.

REPORTS

The notes below indicate the main investigations in the reports covered, in so far as they concern this journal. Where a separate abstract has been made from a particularly interesting section of a report, this is indicated.

429† **Great Britain.** Committee for Colonial Agricultural, Animal Health and Forestry Research. Eleventh Annual Report (1955–1956). [Contained in] *Colon. Res.* 1955–6, 19–115.

This report provides a concise review of the progress made in the many different spheres of colonial agricultural research in the British Commonwealth during 1955–6.—G.L.S.

430 **Netherlands.** Verslag van de Proefboerderij "De Bouwing" te Randwijk over 1955. [Report on the Experiment Farm "De Bouwing" at Randwijk, 1955.] By J. Wind and others. *Mimeo. Publ. 24 Cent. Inst. Landbouwk. Onderz., Wageningen*, 1956, pp. 63.

1. Varietal trial of peas, pp. 16–17. 37 varieties were tested. Alaska (4·2 ton per ha.) was disappointing compared with Kelvedon Wonder (8 tons) and Mansholt × 2117 (9·1 tons per ha.).

2. Spacing trial with field peas, p. 18. The numbers of plants per sq. m. which proved adequate were : Gloire de Quimper, ±105 ; Celsior,

55–70 ; and Lincoln, 90–100. Greater density lowered pod-setting and pod-filling. The foliage (for stock-feed) can amount to 25–30 ton per ha.
3. Tillering in peas, p. 18. This, studied in 7 varieties, was dependent on genetic factors and climatic conditions.
4. Comparison of field-drying methods with reference to grain quality in pulse crops, p. 20. By using a good frame-drying method, mechanical injury can be reduced by more than 50%. The so-called hut frames [composed of 2 hurdles supporting one another] gave better results than tripods.
5. Depression of pea yield through using contact weed-killers (DNC and endothal) 3 days before harvest. The depression amounted to 400–900 kg. per ha.
6. Effect upon the stand and yield of Bintje and Eigenheimer of applying chemical sprout inhibitors to seed potatoes in clamps, pp. 26–7. There was little difference between the treated and the controls.
7. Influence upon potato yield of preliminary storage, whether in clamp or air-cooled chamber, and of the time of sorting and sacking (15 Sept. or 15 Nov.) seed-potatoes, pp. 28–9. No differential effect was obtained from the type of preliminary storage, but there was a clear advantage from using the earlier date for sorting and sacking.
8. Maize. Comparison of six sowing dates, pp. 30–1. The last ten days of April were found to be the best.
9. The after-effects of treating wheat and beans with lindane, aldrin and dieldrin in 1954 upon potatoes grown in 1955, pp. 32–4. No ill-effects were perceptible either in yield or in the culinary value of the potatoes.—G.M.R.

431 **Sicily.** Stazione Sperimentale di Granicoltura. Relazione sull'attività svolta nel biennio 1953–55. [Report on work during 1953–5.] By G. Conti. Catania, 1956, pp. 118, illus.

1. Wheat varietal trials in several localities in Sicily, pp. 49–54. The best variety was derived from Russello × Bidi S.G.g. with 1396 kg. of grain per ha., followed closely by Bufala rossa × Eiti, Eiti × Timilia and Bufala × Biancuccia.

2. Sorghum for grain and forage, pp. 62–4. Results are given from trials with sorghum varieties, obtained from FAO, which were grown with and without irrigation.

3. Trials with sugar-beet sown in autumn and grown without irrigation, pp. 64–77. The varieties which gave the highest root yields were U.S. 56/2 followed by U.S. 75, U.S. 15 and Rovigo AU in the Gela plain, and U.S. 75 in the Catania plain. The varieties which gave the lowest percentages of bolting were Klein AA followed by U.S. 56/2 and Rovigo AU in the Gela plain, and U.S. 56/2 and Klein AA in the Catania plain.

4. Cotton varietal trials, pp. 80–90. The variety Acala yielded best in several localities.—E.B.O.

432 **Kenya.** Department of Agriculture. Annual Report for 1955. Vol. 2. Record of Investigations. Nairobi, 1957, pp. 237.

1. Control of barley fly, *Hylemyia arambourgi*, pp. 3–5. Seed treatment of barley gave good control of *H. arambourgi* when endrin emulsion was used at 0·5–1 pt. per 80 lb. of seed ; or aldrin emulsion at 1 pt./80 lb. of seed. Chlordane emulsion at 0·5 pt./80 lb. of seed gave almost complete control but germination was reduced. Good control of *Heteronychus consimilis* in maize was obtained from 1 lb. of 40% aldrin (wettable powder) per 200 lb. of seed.

2. Cereal varietal trials, pp. 45–61. Wheat. Trials were successfully harvested only at Ol Joro Orok ; Capella, 362.P.1.B.3. and 362.B.1. selections again showed the most promise. Barley. Leading varieties at Njoro were, Heimdal, No. 5, Balder, Proctor and Rigel ; at Kitale, No. 5, Kenia and Herta ; at Eldoret, Heimdal, No. 5, Bonus and Atlas ; at Ol Joro Orok, Kenia, Trebi, Heimdal and Maja ; at Molo, Heimdal, Carlsberg and No. 5.

3. Nyanza Province, pp. 196–209. At Kisii, Dutch Robyjin and A.49 were again the top-yielding potato varieties. The best sorghum varieties were Dobbs ex Kongwa and Dobbs.

4. Rift Valley Province, pp. 210–18. Application of 2 cwt. N per ac. when maize was knee-high was significantly better than 2 cwt. N at sowing, or 1 cwt. at sowing and again when knee-high. A row-spacing of 3·5 ft. averaged 2–7 bags/ac. more than the 6·5-ft. spacing. Agroxone, applied pre-emergence at 0·75 or 1 lb./ac. gave some degree of weed control, but at the higher rate, the yield of maize was reduced.

5. Central Province, pp. 219–24. The highest-yielding rice varieties, Shingo La Majani, Ambaricore, Rathkayaral and Ngindimbo, were also the slowest-maturing.

6. Coastal Province, pp. 225–37. In intercropping trials, maize yielded better when sown as a pure stand than when intercropped with cotton ; sowing later than early April resulted in lowered yields. In one locality, cotton sown in early May yielded similarly when grown as a pure stand and when interplanted ; in another, the interplanted crop yielded better because of the higher cotton-plant population. Cotton on 3-ft. tied ridges outyielded cotton sown on the flat. Cotton and groundnuts grown together on the flat gave significantly better returns than either crop as a pure stand on the flat ; intercropped on 3-ft. tied ridges, cotton did well, groundnuts were poor.—M.P.

433 **Guatemala.** Ministerio de Agricultura, Servicio Cooperativo Interamericano de

Agricultura. Informe anual – 1955. [Annual Report for 1955.] [n.d.], pp. 167.

The selected wheat varieties Supremo 211, Supremo 51 and Fronteira are widely grown, pp. 63–6. The rice variety Bluebonnet is recommended, pp. 71–3.—E.B.O.

434 **Surinam [Dutch Guiana].** Department of Agriculture, Animal Husbandry and Fisheries. Report for 1954. 1957, pp. 124.

1. Rice, pp. 37–45. In a 3-year trial on loamy sand a statistically significant effect was recorded from the application of N but not from that of P and K. In another, on heavy clay, begun in 1953, the following yields in kg. per ha. were obtained : no manure, 2755 ; N, 2559 ; NP, 3270. An experiment in weed control by means of spraying with a solution of 300 ml. tributon (2,4-D + 2,4,5-T) in 20 l. water resulted in the total destruction within 2 weeks of *Commelina nudiflora* and 8 other weed spp. In 1954 the variety VD 5096 was released for rice-growers under the name Dima. This new variety on clay soil is just as productive as Skrivimankoti but has stiff straw, a larger grain, and is less sensitive to daylength. It is not recommended for sandy soil.

2. Groundnuts, pp. 45–6. The variety Matjan yielded at the rate of *c.* 1800 kg. dry nuts per ha. In a trial of 12 varieties, the Indonesian varieties Matjan, Gadjah and Schwarz 21/504 yielded more than did more recently imported varieties. Brazilian 53 and C12/1 were difficult to harvest because of the breaking off of the gynophores.—G.M.R.

BOOKS

435 United Nations. **Proceedings of the International Conference on the Peaceful Uses of Atomic Energy, held in Geneva, 8-20 August, 1955. Vol. 12. Radioactive isotopes and ionizing radiations in agriculture, physiology, and biochemistry.** 1956, pp. 553, bibl. at end of papers, illus., New York ; United Nations, 28 × 22 cm., 63s.

The agricultural section includes studies of crop genetics, soils, fertilizers, the food uptake in plants, and the promotion of useful genetic mutations. The physiology and biochemistry sections summarize the knowledge on animal and plant metabolism and chemistry as related to the use of various radioisotopes. Among the papers presented were the following :

1. The utilization of radioactive isotopes in biology and agriculture in the USSR. By A. L. Kursanov, pp. 3–9.
2. The use of atomic energy in food and agriculture. By FAO, pp. 10–18.
3. The effects on plants of chronic exposure to gamma radiation from radiocobalt. By A. H. Sparrow and J. E. Gunckel, pp. 52–9.
4. Studies in special problems in agriculture and silviculture by the use of radioisotopes. By J. W. T. Spinks, pp. 75–86.
5. Studies on plant nutrition, fertilizer and soil by the use of radioisotopes. By S. Mitsui, pp. 87–8.
6. Uptake and transport of mineral nutrients in plant roots. By E. Epstein and S. B. Hendricks, pp. 98–102.
7. Factors affecting the availability to plants of soil phosphates. By R. Scott Russell and others, pp. 103–8.
8. The use of tracer atoms in studying the application of fertilizers. By V. M. Klechkovski, pp. 109–17.
9. Co^{60} in the study of the role of cobalt as a micro-element in the nutrition of plants. By O. K. Kedrov-Zikhman, pp. 123–9.
10. Utilization of radioactive isotopes in resolving the effectiveness of foliar absorption of plant nutrients. By H. B. Tukey and others, pp. 138–43.
11. The utilization of ionizing radiation in agriculture. By A. M. Kuzin, pp. 149–56.
12. Use of labeled compounds in weed research. By A. S. Crafts, pp. 157–8.
13. Analysis of the movement of substances in plants by means of radioactive isotopes. By A. L. Kursanov, pp. 165–9.
14. Absorption of radioactive sulfur by the fruit system in comparison to the roots of peanuts. By H. C. Harris, pp. 203–7. [See also *Fld Crop Abstr.* 10 : 994.]
15. Effects of gamma rays on sprouting and growth during storage in carrots and potatoes. By K. Mikaelsen and others, pp. 208–10. [See also *Fld Crop Abstr.* 10 : 639.]
16. Biosynthesis in C^{14}-labeled plants ; their use in agricultural and biological research. By N. J. Scully and others, pp. 377–85.—E.B.O.

436 All-Union Scientific Research Institute for Cotton Production. **Works of the Ak-Kavak Central Agro-technical Station.** 1955, pp. 164, bibl. at end of sections, illus., Taškent, Central Asian State Univ., 22 × 15 cm., 8 roubles. [Received July, 1957]

This collection of scientific papers has been published as a basis for extending and improving cotton production. The following are among the papers : Root system and chemical composition of perennial herbage, by M. A. Belousov ; Sowing cotton in narrow rows with criss-cross cultivations, by M. P. Mednis and S. M. Muslimov ; Determining irrigation time by the outer appearance of

the cotton crop, by V. E. Eremenko ; Determining irrigation time for cotton from the suction capacity of the leaves, by A. N. Nešine ; Measures which accelerate cotton development, by N. A. Todorov and A. N. Nešina ; The water regime and fertility of cotton, by A. N. Nešina and N. A. Todorov.—M.H.

437 Iso, E. **Rice and crops in its rotation in subtropical zones.** 1954, Tokyo; Japan FAO Assoc., pp. xxxiv + 611, illus., 26 × 20 cm.

Since the beginning of the century, the acreage under rice in Taiwan has been doubled and the yield almost quadrupled. The author has played a leading part during the last four decades in the research which has made possible this achievement. In this volume he gives an exhaustive account of the results of the investigations which have been carried out in that country during the past half century to improve rice and other crops used in the rotation system by developing better methods of cultivation and by breeding, frequently discussing the significance of the findings to rice production in other Asiatic countries. It is an important book which will be welcomed by agriculturists the world over, all the more so as much of the information provided has previously appeared only in Japanese. The success of this research is obviously due in a very considerable measure to the early recognition of the vital importance of physiological behaviour in breeding and to the unusually close integration between analysis of physiological factors and development of more economic systems of cultivation. The book therefore merits the attention of breeders and agronomists in general as a record of a model programme of crop improvement. The breeding of the numerous Horai varieties of the *japonica* type, which, unlike introductions from Japan and the majority of the native *indica* varieties, are in most cases capable of giving good yields in both the first and second crops of double-cropped fields, has greatly contributed to the intensive utilization of the land, particularly in the central part of the island. By using these varieties, together with the koa system of interplanting while the first or second crop is still standing and keeping the surface wet, growing of summer and winter catch crops in double-cropped fields is possible. Breeding of specially adapted varieties or use of suitable introductions from other countries has also greatly contributed to the successful cultivation of each catch crop. The author divides the 40 chapters into seven parts on (1) general aspects, (2) rice, (3) sweet-potato, (4) flax, (5) wheat, barley, oats and buckwheat, (6) vegetables, tobacco, groundnut, maize, rape and green-manure crops, and (7) jute, *Hibiscus cannabinus* and castor bean. The crops considered in the last part are included for their interest as possible substitutes for rice production. For each crop information is given on the various practical aspects of cultivation. A miscellany of such matters as storage of the product, utilization and manufacturing is also dealt with in chapters on some of the crops. In the section on rice, comprehensive chapters are provided on correlations among agronomic and physiological characters and their use in breeding, on the classification of varieties on the basis of responses to photoperiod, temperature and other environmental conditions, and on varietal distinctions not only in physiological behaviour but in the complete range of economically important characters. The origins of varieties, notably of the Horai group, are usefully indicated. A good deal of information on correlations of characters, varieties and breeding is also given for the winter catch crops sweet-potato, wheat and flax. Typographical errors are numerous and the translation leaves room for improvement : these defects do not however seriously detract from the value of the book.—From *Plant Breeding Abstracts.*

438 Hughes, H. D. and Henson, E. R. **Crop production.** 2nd edn, 1957, pp. xii + 620, bibl. in text, illus., New York and London ; The MacMillan Co., 24 × 16 cm., 48s. 6d.

This second edition is a rewritten and rearranged version of a text book for students first published in 1930. Apart from the introduction to chapters, the work is mainly concerned with North American crop production, including annual field crops, pastures and fodders. In rewriting the book the revising authors (H. D. Hughes, D. S. Metcalfe and I. J. Johnson) tried to confine themselves to giving such information as they believe will stimulate the minds of students and to establish certain basic principles in relation to crop production, rather than attempt to produce an encyclopaedic work of reference. The student is first shown the paramount importance of field-crop production in providing man's food and clothes. Then follows a description of the methods by which our knowledge of crops is obtained. Finally, the basic information needed for growing the different crops is presented, followed by discussion of the more important crops, their improvement, production and uses. The work is highly fragmented, being divided into no less than 55 short chapters, covering an immense field.

An unusal feature of the book is the question(s) for students which follows immediately after the title below each illustration. Many of these questions, and those at the ends of chapters, go far beyond the information provided in the text, the authors' intention being to stimulate wider reading. The book is generously illustrated and attractively presented. There is a useful glossary of scientific and other terms.—A. G. G. Hill.

439† Went, F. W. **The experimental control of plant growth. With special reference to the Earhart Plant Research Laboratory at the California Institute of Technology.** 1957, pp. xvii + 343, bibl. 181, illus., Waltham, Mass., USA ; Chronica Botanica Co. (Publ. 17); London, W.C.2. ; Wm. Dawson and Sons Ltd., 23·5 × 16 cm., 68s.

This interesting book is mainly devoted to a description and discussion of the phytotron of the California Institute of Technology, and a number of published and unpublished results obtained in it up to 1956. By then, the Earhart Plant Research Laboratory had been in use for 6 years and the Clark greenhouses for 16 years.

Part 1 deals, in some details, with the construction and operation at the phytotron and covers such aspects as : the general principles of air-conditioning in greenhouses, maintenance of relative sterility, the growing and handling of plants, experimental routine, and the accuracy and reliability of environmental control. Constructional and operational costs are referred to in the concluding chapter. A useful inclusion in the chapter on the handling of plants is a detailed list of all investigators, and the subject of their work, who have used this particular phytotron. This is followed by a section devoted to a discussion of some of the results obtained on the climatic response of individual plants in an attempt to get an overall picture of basic plant behaviour and indicate the optimum growing conditions for each species. Experimental results with potatoes, sugar-beet, *Pisum sativum*, *Vicia faba* (contributed by L. Evans), sugar-beet, maize, flax, grasses (by W. M. Hiesey), desert plants and alpine annuals are summarized. A chapter by H. Helmers on chaparral plants reports studies carried out to find a plant or group of plants (a) for use in sowing to obtain a protective cover on mountain slopes denuded by fire, and (b) that could replace or supplement the native vegetation and thus give better protection to the soil and unburned slopes. The phytotron has proved of particular value in this work since the time needed to test the growth response of plants to a range of temperatures has been reduced from 5–10 yr. or more to less than 1 year, and the number of species to be field-tested for drought has been reduced by more than 80%.

Part 3 contains general discussions on the results obtained, their interpretation and significance. The work has been carried out on genetically uniform material and tomato plants have been used to a large extent. Topics covered include : genotypic and phenotypic variability ; the analysis of growth ; plant climatology ; photosynthesis ; nutrition ; water relations ; methods for determining water loss (by W. C. Ashby) ; periodicity, and the effects of smog. Chapters are also devoted to: ecological factors and plant distribution ; aspects of germination such as longevity of seeds, delayed germination, and the effects of temperature and rain on germination, this last with particular reference to the behaviour of desert plants ; and biochemistry (by A. W. Galston), mainly the rôle of auxins and adenine in plant growth.

In the concluding chapter, the author mentions the practical significance and application of the phytotron to other fields of plant research, including agriculture. " I hope that information contained in this book will make it clear that such surveys [of the climatic requirements of crop plants] are possible because of the effectiveness of phytotrons and are practical because several examples have shown that phytotron information is applicable to field problems." The significance of phytotrons for future botanical work is reviewed with particular reference to the variability and reproductibility of experiments and results. The author adds, " No botanical research facilities should be built any more without a considerable degree of environmental control . . . . A phytotron may reduce the complexity of [plant] response sufficiently to approach problems which formerly were submersed in a morass of statistics."—M. Pennington.

440† Bergbau Handel. **Magnesium—a plant food. Essays on the problem of magnesium fertilization.** Translation from the German by G. and S. Lewin. [n.d.], pp. 239, bibl. (separate for each essay), illus., Berlin W.8, E. Germany ; Bergbau Handel, 14× 20·5 cm.

The publication consists of a collection of papers on the magnesium nutrition of plants. Most of these papers have been taken from German agricultural journals, e.g. *Zeitschrift für Pflanzenernährung, Düngung und Bodenkunde* ; one or two are original papers and are marked in this review with an asterisk.

The contributing authors and their subjects are as follows : *A. Arland, New methods of soil analysis ; *J. Enzmann, The application of magnesium sulphate fertilizers and their effect on water utilization by cereals ; A. Jacob, Observations on the question of magnesia fertilization ; R. Schreiber, Observations on the effects of magnesium upon the yield of cereal crops and on the assimilation of the nutrients K_2O and MgO by cereals ; *E. Truninger and A. Hasler, Recent observations on the action of boron and magnesium as plant nutrients ; R. Schreiber, The influence of the magesium contents of the various potash fertilizers on the yield and quality of summer wheat ; K. Scharrer and R. Schreiber, Pot tests on maize with various types of potash salts, coupled with an investigation into the action of magnesium and boron ; G. Michael, The absorption and distribution of magnesium and its

function in the more complex green plant ; *O. Engels, Recent investigations into the question of the efficacy of magnesia as a plant nutrient and of the magnesia contents of the various types of soil ; *W. Jessen, Symptoms of potassium and magnesium deficiency and results of potassium chloride and potassium magnesia fertilization on the growth of various varieties of timber ; A. Jacob, Magnesian potash salt fertilizers. Potash fertilizers of the future.

An introductory note explains the importance of applying Mg to soils now that modern methods of fertilizing are employed.—D. Brown.

441† UNESCO. **Arid zone research. 5. Plant ecology. Proceedings of the Montpellier Symposium.** 1955, pp. 124, bibl. in text, illus., English or French summaries, Paris ; UNESCO, 27 × 21 cm., 16s. 6d.

This publication consists of the papers presented to an international symposium on plant ecology of arid areas held at the Institute of Botany of the University of Montpellier in the autumn of 1953 " to promote the co-ordination of research on scientific problems concerning the arid zones". Nineteen scientists from 15 countries took part. Among the papers are the following : (a) A study on the main characteristics of the ecological groups of arid zone vegetation by M. Drar ; (b) Structural and physiological features of the vegetation of arid and semi-arid areas of the Union of South Africa by R. A. Dyer ; (c) Characteristics and distribution of arid zone vegetation as related to land management in the United States by W. G. McGinnies ; (d) The arid vegetation types of tropical countries and their classification by R. E. G. Pichi-Sermolli ; (e) The structural and physiological features of the Rajasthan Desert by F. R. Bharucha ; (f) Climatic, ecoclimatic and hydrological influences on vegetation by H. Boyko ; (g) Rainfall and vegetation belts in arid North-East Africa by M. Kassas ; (h) The effects of rainfall on steppe vegetation and roots as a factor in its hydration by H. Birand ; (i) General review of the relations between soils and vegetation by G. Lemée ; (j) Trace element nutrition in the Union of South Africa and calcareous Spain by W. A. Roach ; (k) Influence of changes of vegetation on arid soils by J. M. Albareda ; (l) Chlorosis in crops in semi-arid zones : the influence of the soil and light by C. Rodriguez and C. Diéz Altarés ; (m) Effects of drought and overgrazing on density composition and yield of rangeland in central high plains of the United States by F. W. Albertson. Reports h, i, k and l are in French, the others are in English. There is a subject index.—E.B.O.

442 Reifenberg, A. **The struggle between the desert and the sown. Rise and fall of agriculture in the Levant.** 1955, pp. 109, bibl. 106, 72 plates, Jerusalem ; Publishing Department of the Jewish Agency, 28 × 22 cm., $4·50. [Received Oct. 1957]

The fruit of a lifetime of study and research, the book traces the pernicious influence of deforestation, of soil erosion and of bad administration through the ages and the remedies these suggest. It describes the age-old struggle between the " desert and the sown " founded on agricultural, archaeological and historical material recorded in detailed surveys.

Its six chapters are devoted to a detailed examination and analysis of the topography and geology of the Levant, its climate, the destruction of vegetation, soil erosion, irrigation installations, their origin and decay and, finally, the rise and decline of agriculture in the Levant from prehistoric times to the Turkish period. In his introduction, W. C. Lowdermilk summarizes the importance of such a study for the " education of peoples of all walks of life " and writes, " if civilization is to win this race against famine, it must be done with the determination and support of the whole population. Farmers cannot do it all on their own account. It is a challenge that must be accepted by the people concerned as a whole." Each chapter is followed by an extensive bibliography. There are 72 excellent plates. The Hebrew edition of this book was published in 1950 for the Bialik Institute, Jerusalem.

443 Ludlam, F. H. and Scorer, R. S. **Cloud study. A pictorial guide.** 1957, pp. 80, illus., London ; John Murray (Publ.) Ltd., 24 × 16 cm., 12s. 6d.

This excellent collection of 73 cloud photographs, some coloured, with their simply worded explanatory notes, should be of real interest to agriculturists and others concerned with understanding clouds and rainfall. The 12-page introduction to the photos gives admirable explanations of the processes leading to the formation of different cloud types and the precipitation of rain. There is no index, unfortunately.—A. G. G. Hill.

444 Plant Protection Ltd. **Plant Protection Conference 1956. Proceedings of the second International Conference at Fernhurst Research Station, England.** 1957, pp. 315, bibl. in text, illus., London ; Butterworths Scientific Publications, 25 × 16 cm., 50s.

Of the 17 papers reported in this book, the following 7 are of interest to readers of this journal : World aspects of crop production, by J. G. Knoll, 3–12 ; Genetics in relation to crop production, by S. C. Harland, pp. 31–41 ; The physiology of immunity of some agricultural plants, by K. T. Suchorukov, pp. 42–52 ; Blackarm disease [*Xanthomonas malvacearum*] of cotton and its control, by R. L. Knight, pp. 53–9; Chemical weed control in Sweden. Some results and viewpoints, by E.

Åberg, pp. 148–57; Comparative tests with chemical products for preventing the sprouting of potatoes, by V. J. Masten and J. Hočevar, pp. 158–61; The residual effects of crop-protection chemicals in the soil, by F. J. D. Thomas, pp. 215–22.—P.J.B.

445† COMMONWEALTH BUREAU OF SOILS. GREAT BRITAIN. **Bibliography of soil science, fertilizers and general agronomy. 1953-1956.** 1957, pp. xxii + 661, Farnham Royal; Commonw. Agric. Bur., 22 × 14·5 cm., 70s.

NEWS ITEMS AND NOTES

Germany

446 CONFERENCE ON VEGETATION AND SOIL SCIENCE. An account by T. A. de Boer of an international Conference on Vegetation and Soil Science held in North-western Germany in September, 1956, is published in *Meded.* No. 2 of the Wageningen Experiment Station for Field and Grassland Cultivation, 1957, pp. 7, mimeo. Some of the 19 papers delivered, which will eventually be published, are briefly summarized.—G.M.R.

India

447 BOTANICAL SURVEY OF INDIA. During 1956–7, the Botanical Survey of India, Western Circle, conducted plant explorations in the botanically unexplored areas of North Kanara, Kerala, Khandesh, Poona, Kolaba, Satara, Kutch, Saurashtra and Aravalis, during the different seasons. Over 100 expeditions were made, and all types of vegetation, including forests, grasslands and aquatic plants, whether phanerogam or cryptogam, were collected from different habitats and at different growth stages. The collections promise to yield data of far-reaching importance from the systematic, phyto-geographical, ecological and sociological stand-points. The survey has undertaken the revision of Cooke's Bombay Flora. *Curr. Sci.*, May, 1957.—D.B.

Pakistan

448 THE EXTRA-SHORT-STAPLE COTTONS grown in Pakistan are Camilla (*Gossypium arboreum* var. *cernuum*) and the desi cottons (*G. arboreum* var. *neglecta*). Camilla cotton has a staple length of 6/16–8/16 in. and a fibre weight of 0·4 millionth of an ounce per inch. Its low wax content gives it a particularly harsh feel. The desi cottons have a staple length of 6/16–10/16 in. and a fibre weight of 0·257 millionth of an ounce per inch. Since both are in great demand in foreign markets for mixing with wool and for other specialized uses, the Pakistan Central Cotton Committee has sanctioned schemes for the breeding of coarse, harsh cottons.—*Pakist. Cotts* Dec., 1956.—D.B.

449 A SURVEY OF COTTON PLANTS IN GOA was made on the advice of Professor Harland who is of the opinion that, in the past, the Portuguese introduced cottons of high fibre-strength. These strains should have retained their purity owing to their having been grown in residential compounds and having survived as isolated ornamental plants in Hindu houses, temple gardens, and kitchen gardens. The 3 main types found were: *Gossypium arboreum*, *G. hirsutum* and *G. barbadense*. Samples were collected for breeding. The 2-man, 10-day survey also had access to interesting historical records of cotton-growing in Goa.—*Pakist. Cotts* Jan./Feb., 1957.—D.B.

Australia

450 A CONFERENCE OF CEREAL BREEDERS AND GENETICISTS was held at Longerenong Agricultural College, Dooen, Victoria, from 7 to 10 Aug. 1956. This was the third such conference and 48 papers were presented dealing with cereals, flax, linseed, peas, and herbage legumes and grasses.—C.L.S.

USA

451 INTERNATIONAL CONFERENCE ON SCIENTIFIC INFORMATION. The National Science Foundation, the American Documentation Institute, and the National Academy of Sciences—National Research Council are sponsoring an International Conference on Scientific Information to be held in Washington, D.C., early in November, 1958. All requests for further information should be addressed to the Executive Secretary, Dr. Alberto F. Thompson, International Conference on Scientific Information, National Academy of Sciences—National Research Council, 2101, Constitution Avenue, Washington 25, D.C.—*Curr. Sci.* May, 1957.—D.B.